ORIGINS

The Journal of The Biblical Creation Society

SPECIAL ISSUE

Creation – Basics & Beyond

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• Journal of the Biblical Creation Society •

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In addition, writers in a popular vein are needed, but accuracy and solid content are still essential.

News items that may be of interest are also sought.

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Editorial

FOR over twenty-five years, the *Biblical Creation Society* has been publishing biblical and scientific studies into the subject of Biblical Creation. We have produced a *Creation Manifesto* in which we have sought to identify the minimum criteria to which we consider a Bible believer must be committed on this subject. We have printed papers expounding various sections of the manifesto.

As we look back over the years, we realise that, though our Manifesto position has not changed, there have been advances in the world of creation research in which members of the society have been active. It is a generation ago that Sylvia Baker, one of our founder members, produced her excellent booklet, *Bone of Contention*. We have been delighted to see this published in several other languages and distributed by other societies as well as *BCS*.

The committee felt that the time had come for us to produce a special issue of our journal, *Origins*, which would be a 'back to basics' edition, reviewing as full a range of issues as possible. The editorial team would wish to put on record our thanks to the authors who have put so much work into these papers. Some of the work is a fresh approach to the subject and recognises the extent of scientific research over this last generation.

Biblical Creationists are committed to the biblical account of creation as an historical record which is trustworthy. As we have made plain in previous issues, we accept that we must always check that we are understanding this record correctly and not imposing on it our own prejudices and ideas. That is the nature of our biblical research.

In parallel with this, we are active in researching the scientific aspects of the subject of origins. Some critics think we are anti-science. This is far from the truth. Many of us are qualified scientists and seek to use our expertise to examine this approach. Scientific theories are proposed as a result of rigorous research by honest men and women. Unfortunately this does not make them infallible. That applies to creationists *and* evolutionists, of course! So all our work must be examined critically.

In this special publication, we seek to combine these two areas of research, biblical and scientific, and show that the scientific record is consistent with the biblical account of Creation. The papers also point the way forward for further research and clarification. We trust that our readers will find this profitable reading and we seek to present it to the glory of God, the Creator.

J.H.J.P.

Biblical Creation Society can be found on the internet at http://www.pages.org/bcs/ Please note the change of address. Through this you can also find links to most other creation sites on the world wide web.

A Designer-made World?

J. H. John Peet

CHARLES DARWIN recognised that there was a critical issue underlying his theory. He wrote, 'If it could be demonstrated that any complex organ existed which could not possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down.' His current day protagonist, Richard Dawkins, proposes that modern biologists should always be looking for a mechanistic solution to any apparent flaw that creationists can point to, believing that one will surely be found.

This is an act of faith, of course. For someone convinced that the scientific method reigns supreme, this is not a scientific statement. We need an independent means of testing the claims of creationists and evolutionists.

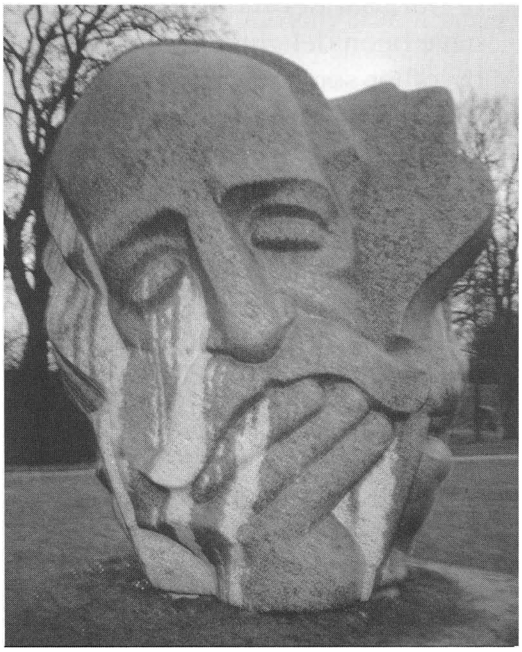
William Dembski, in his book *The Design Inference*, proposes an 'Explanatory Filter' which can be used to isolate those systems which might reasonably be considered as those that have been designed. The principles are obviously more widely applicable than to the origin of living systems but we shall apply them in our narrower context.

Dembski summarises the approach as, 'Whenever explaining an event, we must choose from three competing modes of explanation. These are regularity, chance and design. To attribute an event to a regularity is to say that the event will (almost) always happen. To attribute an event to chance is to say that probabilities characterize the occurrence of the event, but are also compatible with some other event happening. To attribute an event to design is to say that it cannot reasonably be referred to either regularity or chance.'

As Dembski admits, there are limitations to the approach. For example, a designer might produce a system that imitates the results due to chance. However, these limitations do perhaps strengthen his overall argument rather than weaken it.

When visiting a park in Sigulda, Latvia, this author observed a large stone which had an appearance of a thinking man, with fingers across the chin. The stone was one of a number in the park. It was a wet, windy day. How did this feature arise? Dembski's explanatory filter led me to the conclusion that it was designed. I doubt whether anyone would seriously question that conclusion, but it is a good exercise for the reader to convince himself or herself that such an item was the work of a sculptor, not of natural forces.

Can we apply this to the biological world? Michael Behe, author of *Darwin's Black Box*, believes that we can. Darwinists, such as Dawkins, believe that we can show the development of a modern living system from a more primitive one, through a series of steps. Each step would have a selection advantage which would cause it to be passed on to its offspring. Subsequent generations would develop further changes which would supplement the previous ones until, eventually, a more complex phenotype has arisen.

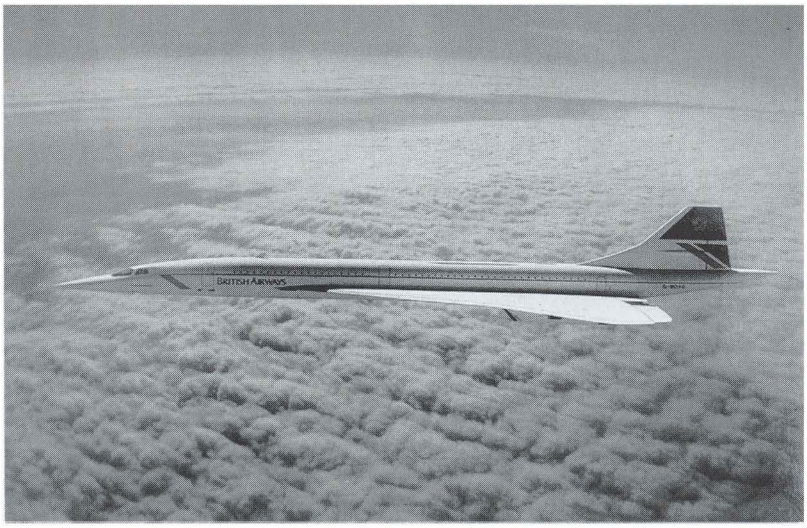


Behe challenges this claim with a number of telling examples in which the proposed steps would have no selection advantage, indeed they might be detrimental without the subsequent steps already in place. He describes these systems as 'irreducibly complex'; the removal of one part of the structure or process would render the system useless.

In *Not by Chance,* Spetner examines the assumption that a mutation (a genetic change) could take over the population and so assist the process of evolution. He shows that this problem has been ignored by evolutionists. Not surprisingly, his calculations demonstrate that such a process is impossible.

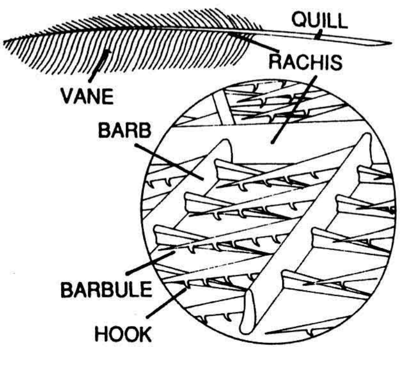
Engineers have a better appreciation of the concept of design than do scientists. This is not surprising since their work is based on *integrated design*. For an engineered system to work, the whole must be carefully designed, each part being integrated with the others.

Example 1 : Bird flight



Consider, for example, an aircraft. The wings are, clearly, essential to lift the body of the plane. But they have to be adjustable so that the vehicle can climb or descend and turn. The craft needs a propulsion system and a means for the pilot to manouevre it. It also needs a means for safe landing. The materials for construction have to be carefully chosen and the structures designed to withstand the pressures to be exerted onto the aircraft. One could propose an 'evolutionary' development from the simple wheel, through the carts and cars to the first plane. What such a scenario does not eliminate is the involvement of a designer. Even the design of the Concorde passenger plane after several generations of other aircraft did not eliminate the need for a team of leading English and French designers working for seven years to produce the new plane.

This scenario is very relevant when we consider the origin of the bird. The same principal systems are required for the bird to fly and yet, I would argue, the bird is more complex. Consider the wings. They must be even more flexible than those of the plane. Each wing is constructed from feathers, of course. (The proposed scenario by the evolutionists of the fragmenting scale becoming a feather is clearly a non-starter. Aside from the intricate detail to be discussed, it is clear that an intermediate stage between a scale and a feather would be useless to the creature, giving it no selective advantage but rather natural deselection). Each feather consists of a complex network of barbs and barbules. The barbs extend from the central stem in both directions. Attached to these barbs are the fine barbules which can link the barbs together through a system of hooks on alternate barbules. As the wing moves downwards to drive the bird forwards, the hooks link the barbules together to give a closed surface. They then have to unhook so that the tiny muscles can turn the barbules and open the surface for the upward movement. This is a similar system to that on a zip fastener. In the wing, there are estimated to be a million hooks per feather and each movement of the wing has to fasten and unfasten these. The feathers must be kept oiled as the dry feather would cease to function. This oil is produced from the preening gland at the base of the spine and distributed by the bird using its beak.



The energy required for this propulsion is obtained from food and must be generated rapidly. As with an aircraft engine, the air has to enter and pass straight through the lungs. There is not time for the two-way action as in humans and non-avian animals. This system is unique in the animal world.

Example 2 : Monarch butterfly

This creature has several lessons to teach us concerning design. The butterfly lays its eggs on the underside of a milkweed leaf. Obviously being beneath the leaf, the eggs are hidden from some of its prey. But the leaf is also unpleasant to taste and that keeps other predators at bay. On the other hand, the caterpillar which hatches from the egg is able to eat this leaf and so gets its nourishment from the plant. There are several weeks to pass in which the caterpillar grows and sheds its skin five times to house the enlarged body. At the end of that time, it spins a silk cocoon into which it 'hides'. (The whole process is one of marvellous design and worthy of further description).

Inside this pupa, the structure of the caterpillar quickly breaks down to generate a green liquid. A heart is the first thing to form, being observed on the first day, and is followed by the other organs of the butterfly. On the sixth day the wings can be observed through the silk enclosure. Provided the temperature is right, the butterfly emerges on the next day. The earth-bound caterpillar reaches into the sky. The three simple eyes (observes light and darkness only) become two compound eyes with six thousand lenses each (observing colour and ultraviolet light). The butterfly is able to migrate 3,000 miles from Canada to Mexico with pin-point accuracy, in spite of travelling for 16 hours across the sea and even being blown off-course. It is believed that the complex eyes are able to use the sun to navigate and microscopic particles of iron in its head are able to detect the earth's magnetic field and thereby enable it to accomplish this amazing navigational feat.

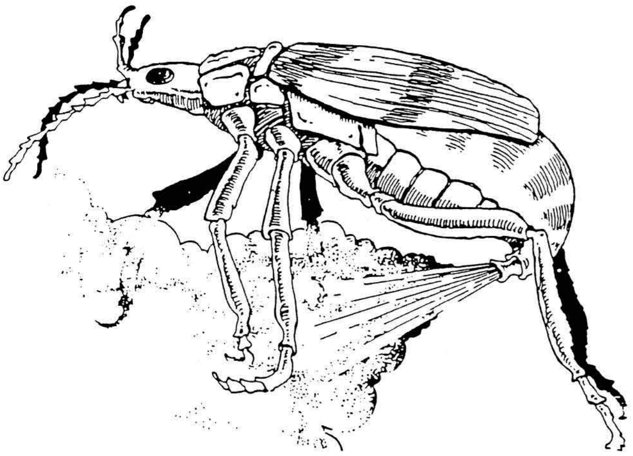
The genetic information for the egg, caterpillar, pupa production and the butterfly all have to be present in the first caterpillar, or was it butterfly! (And remember, when it comes to the 'chicken-egg argument' (which came first?), it had to be male and female animals in order to get the first egg fertilised!). The genetic information must be amazingly

complex and yet properly ordered so that each stage is able to complete its phase precisely and on schedule.

Example 3 : Bombardier beetle

This fascinating creature was identified by Behe as one of the key examples of design. The beetle is distinguished by its ability to repel enemies with a blast (or series of blasts) of hot, toxic gases. As a chemist, I find the idea of making nasty smells fascinating! Many school-boys in past generations had home chemistry sets in which they delighted in achieving such objectives. As a professional chemist, I will either know of possible reactions or can look them up in the library. The chemicals can be collected from the stores or made in a separate stage. Suitable apparatus can be selected and assembled. But can the beetle do this in discrete chance stages?

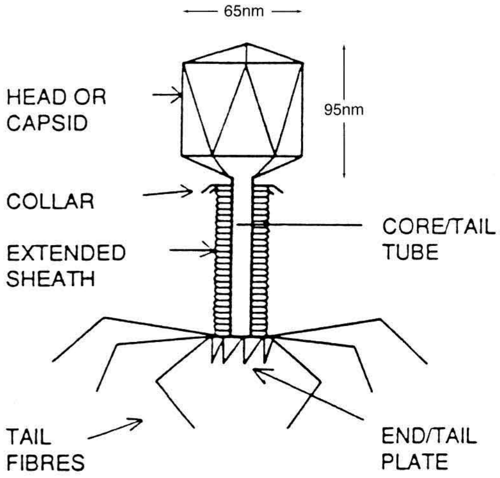
The selection of the chemicals (hydroquinones and hydrogen peroxide) is not one that would be achieved randomly as they barely react on mixing. They need to be triggered by a specific enzyme. Each of these two chemicals has to be synthesised in concentrated form in the glands and stored in a separate chamber, the enzyme generated in the walls of the 'explosion chamber'. The storage vessel and the explosion chamber have to be separated by a sphincter muscle which controls the passage of the chemicals between the two. The explosion chamber has to be constructed of tissue strong enough to withstand the high temperatures of the gases (100 C).



Without the complete structure and chemical system in place, the separate entities have no selection advantage and no alternative function. Here we have an integrated system requiring careful design.

Example 4 : Bacteriophage T4

Imagine an automatic syringe that can detect its 'victim' and then inject its load into the host. Think about the necessary design and then reduce its size to the microscopic scale (about 10^{-5} cm) so that it can inject a bacterium. This is a non-living system which cannot undergo mutation. It cannot develop though separate steps. So how could it have evolved? Precision instruments require a designer.

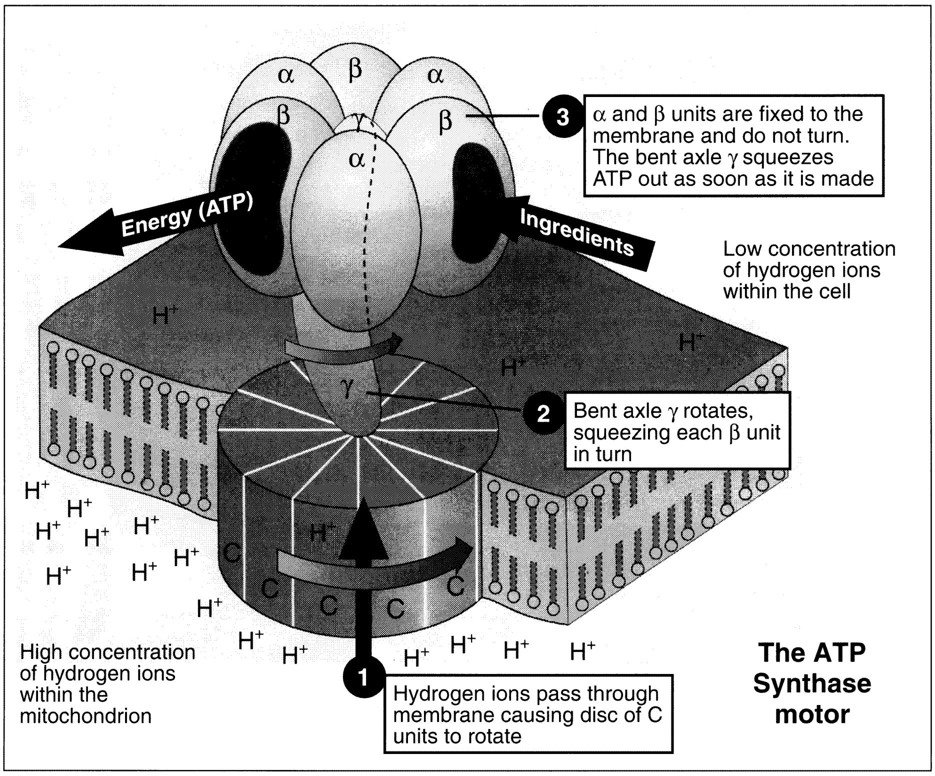


Example 5 : ATP synthase

The mitochondrion in the cell is the energy source that drives the chemical processes. The energy is produced by a chemical labelled as ATP (adenosine triphosphate) generated by an enzyme called ATP synthase. Recently this system has been studied by Nobel prize-winners, John Walker and Paul Boyer. We require our body weight in ATP every day. It is generated through ten thousand million million (10^{16}) tiny motors in the mitochondria. Clearly the process has to be very efficient. Boyer and Walker have succeeded in detecting this incredible motor located in the membrane of the mitochondrion. The ATP is manufactured from ADP (adenosine diphosphate). Its breakdown into ADP releases the energy to drive other reactions.

$$\mathrm{ATP} \Leftrightarrow \mathrm{ADP} + \text{phosphate} + \text{energy}$$

The wheel driving this motor is a protein (called C-protein) to which is attached an asymmetrically positioned protein (γ-protein). The wheel rotates at 100 revolutions


α
β
α
β
β
γ
α
3
α and β units are fixed to the membrane and do not turn. The bent axle γ squeezes ATP out as soon as it is made
Energy (ATP)
Ingredients
Low concentration of hydrogen ions within the cell
H+
γ
2
Bent axle γ rotates, squeezing each β unit in turn
C
High concentration of hydrogen ions within the mitochondrion
1
Hydrogen ions pass through membrane causing disc of C units to rotate
The ATP Synthase motor

per second. It is turned by the migration of hydrogen ions (acidic material) across the wall. The γ-protein paddle turns inside a ring of six more proteins which are fixed in the membrane. These proteins are alternately labelled as α-protein and β-protein. ADP and phosphate enter the β-protein and react to give the required ATP. The eccentric motion of the γ-protein squeezes this protein and expels the ATP. On each turn of the wheel, three ATP molecules are expelled (one from each β-protein).

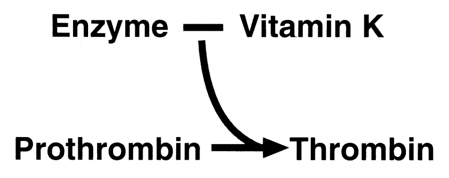
J. B. S. Haldane commented (in 1949) that evolution could never produce 'various systems, such as the wheel and magnet, which would be useless till fairly perfect.' I wonder what he would have made of this motor!

Example 6 : Blood clotting

Another example of an irreducibly complex system is the blood-clotting process. In order to produce the clot, fibrinogen is required. This forms a network in which the blood cells are trapped, forming an immobile structure. The formation of the fibrinogen is activated by thrombin.

BLOOD COAGULATION

(a partial and simplified scheme)



If the thrombin was present in the blood naturally, it would cause spontaneous coagulation of the blood, so it has to be stored in an inactive form, prothrombin. Thrombin is produced from this by the action of an enzyme. (Several enzymes are referred to in this article and it should be noted that each is different. Enzymes are very specific in the reactions that they catalyse). Since the presence of this enzyme and prothrombin would cause automatic coagulation, the process also needs vitamin K as a co-enzyme, that is, a chemical that activates the enzyme.

Of course, if the enzyme, vitamin K and prothrombin are already present in the blood, coagulation has to be inhibited. This is achieved by storing the enzyme in a pre-enzyme state. This sequence of processes is just the 'tip of the iceberg'. A series of complicated, integrated processes is triggered by exposure of the flesh at the cut surface. If any one of these steps is hindered, the coagulation process is prevented. There is also an anti-coagulation system of comparable complexity to prevent the whole blood system clotting! None of these steps in the cascade of reactions is of any value alone and the whole system collapses if one step is hindered, for example, by a mutation.

Conclusion

When we apply the Explanatory Filter to these situations, we find that the only reasonable answer is that we are looking at design. The regularity test indicates that we can expect any event to occur because it is the result of a natural law such as the law of gravity. There is no natural law that would generate the blood clotting process. Chance would not generate an ordered system such as the ATP synthase enzyme. The only option is to believe in design. The only designer that can be identified is our God, the Creator of the heavens, the earth and all that is in them.

Further Reading

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Biology Textbooks and the Evidence

Nancy Darrall

THE subject of evolution is something that we meet early in education. It is in our textbooks alongside anatomy, respiration, reproduction, health and disease. We can see the truth of these other topics by observing and by doing experiments. For example, we can see for ourselves the bone structure of man by looking at a skeleton, we can observe reproduction by watching the school mice and rabbits. So, when evolution is presented in the next chapter, we may well think that the same level of truth is here, either by observation or experimentation.

The aim of this article is to consider the most common proofs of evolution given in the 'A' level textbooks used in schools today. It is recommended that such a book is read alongside this article if possible.

The modern day theory of evolution was first described in the 'The Origin of Species' by Charles Darwin. All plants and animals are thought to have originated from a single celled life-form by mutation and natural selection. Along the way new species were formed which represented building blocks each adding a little to the family tree of life. New information was added to develop new designs and so new types of life appeared.

To some people, the development of a new species is taken as proof of evolution. However, this is not so. Consider the following parallel. Alphabet spaghetti consists of shapes of pasta in a tomato sauce. If you went shopping and saw on the shelves various types of alphabet spaghetti, the first tin containing the letters A–C, the second D–F and so on, what would you decide? Are there a number of new products now available or are we seeing the same product in a variety of packaging? The different types of tins may be given different bar codes, but would this make any difference? Clearly the answer is no! The same applies to evolution. If evidence can be found for the development of new design features, of new genes containing new information, for example, coding for a new organ, then this is positive evidence for evolution. However, if the new species are simply the original form split up by beak size and shape, plumage details or body size, then it provides no more evidence for evolution than alphabet spaghetti from A–C does for a new sort of tinned food. There may be different species names by which the forms can be distinguished, but the changes do not form a single step in evolution to more complex life-forms. Worse still, if the new products contain less information, or coding for enzymes of lower specificity, then we are seeing, rather than evolutionary advance, the degeneration of previously well-adapted forms. This issue comes up in several of the sections below, so please use the principles above to test the validity of the textbook evidence.

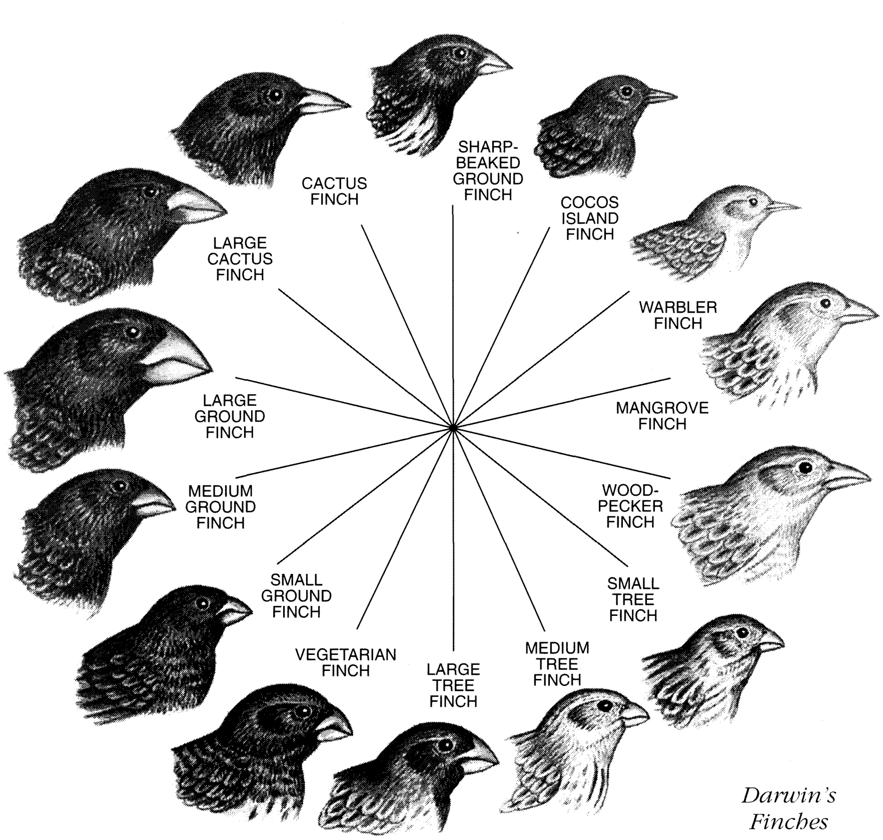
Geographical Distribution

Some textbooks state that the geographical distribution of plants and animals provides strong evidence for the evolution of organisms. New species evolved at a particular site and then dispersed outwards from that area to other parts of the world. During dispersal other species also arose. Present day distribution is a result of the timing of the events in evolution and changes in the geography of the world which might provide barriers to migration.

The alternative of creation is put across as a belief that the creation of life forms occurred in the same places as they are found today. The absence of certain life forms from places where they could flourish is then taken as evidence against this view. One example would be the absence of rabbits from Australia until introduced by man.

Another example given for evolution in textbooks is that of the family Camelidæ. This includes camels, which are now found in Africa and Asia, and the closely related llamas, which are only found in South America. Fossil evidence suggests intermediate forms throughout North America, Asia and Africa. The history of the earth as found in Genesis includes a world-wide, catastrophic flood after the creation, so no plant or animal would be found in their original site of creation. Recolonisation by plants and animals from where they survived the Flood then occurred as far as was possible with barriers of sea, mountain and desert. This explanation of plant and animal distribution is as possible as distribution following evolution at a particular place; so neither proves nor disproves one view or the other.

The show-case example in textbooks is that of 'Darwin's finches'. A flock of finches migrated from the mainland to the Galapagos islands. Now there are 14 different species living in a variety of different environments and with diverse feeding habits. The classification is based on the differences in the size and shape of the beak, feeding habits and plumage. Interbreeding between the species is rare. Any flock of birds today will vary in beak size and plumage. In their new environment, there would have been opportunity for these finches to express more of the



Darwin's Finches

variation in their genotype as they spread out across the different islands into different habitats. All these birds are clearly still finches; there is no evidence for any new design features, such as new organs not previously seen in finches and so there is no evidence for evolutionary progression.

The evidence for variability within kinds, demonstrated by the finches is entirely consistent with creation. The biblical definition of an original creation as 'one that reproduces after its kind' does not exclude variability in features such as size or shape, colour or time of breeding. What it does exclude is the development of new design features such as feathered wings in kinds other than birds and an entirely new feature such as an external ear in birds.

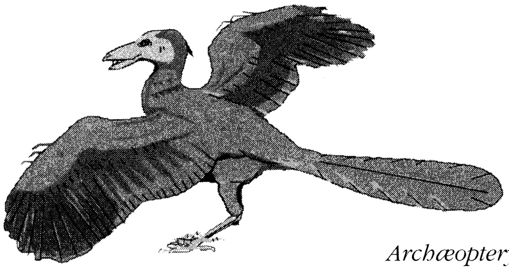
The fossil record

Textbooks describe the fossil record as the 'best evidence' and 'one of the main sources of evidence' for evolution. Examples are given of a succession of fossils from simpler to more complex life; from invertebrates to fish, amphibia, reptiles and birds, mammals and finally humans when moving from older to younger rocks. The existence of intermediates between groups are illustrated in textbooks by *Archæopteryx* and the series of fossil horses.

The sequence of fossils in the rocks, moving from invertebrates to mammals and from algæ to flowering plants with progression from the older rocks to the more recent, is a real observation. However, when each group first appears in the fossil record, they were already specialised and highly characteristic, not generalised and simple forms nor even only partly formed, as would be predicted from the theory of evolution. The fossils that have been found are easily recognisable as either belonging to groups known today, entirely different and now extinct, or displaying a mixture of characteristics of two or more groups.

The search for missing links between groups has continued for the 140 years since Darwin first pointed out this necessary, but lacking, information needed to support his theory. The absence of intermediates between groups is striking in both animals and plants. For example, between non-flowering and flowering plants, between invertebrates and fish (which were the 'first' vertebrates) and between amphibians and reptiles.

Archæopteryx is often given as a key example of an intermediate. Some features are typical of reptiles; for example, the bones, which are not light and hollow as in birds, the tail, with a bony skeleton and the presence of teeth and claws. On the other hand, the feathers include all the intricate design features of modern birds and the shape of the inside of the brain case shows that the parts of the brain responsible for controlling balance and co-ordination of fine motor activities are well developed, just as in modern birds. The combination of characters makes classification as a reptile or bird difficult and presents a problem similar to classifying the platypus, an egg-laying mammal, and *Peripatus*, which has features of both annelids and arthropods. Each design feature, whether limb structure or feather is fully developed, and so the animal is rather like a mosaic of features. The fossils do not show evidence of the gradual development of features, whether the feathers or the brain or the complex function of flight. This means that *Archæopteryx* is difficult to classify, but is not intermediate in terms of evolutionary development.



Archæopteryx

The horse series is the most frequently quoted example of evolutionary transitions. It is a genuine record of change in structure over a period of geological time. The major trends are an increase in body size, a decrease in the number of toes and an increase in the crown height of the teeth, but no new characteristics are documented. The changes all occur within the horse family, likely to be a single kind from their creation. The family tree is less like a straight line of progression and more like a branching bush with many twist and turns, offshoots and dead ends. There is no consistent increase in body size, and one genus contains both one and three toed forms, showing that these are closely related. Similarly, rib count varies in the modern horse showing that it is not a major feature in the progression.

The number of new design features that would be required to develop to enable one group to evolve to the next would mean that many, many different intermediate forms should be found in the fossil record documenting the many stages of progression. These intermediates are not found and so the fossil evidence favours Creation.

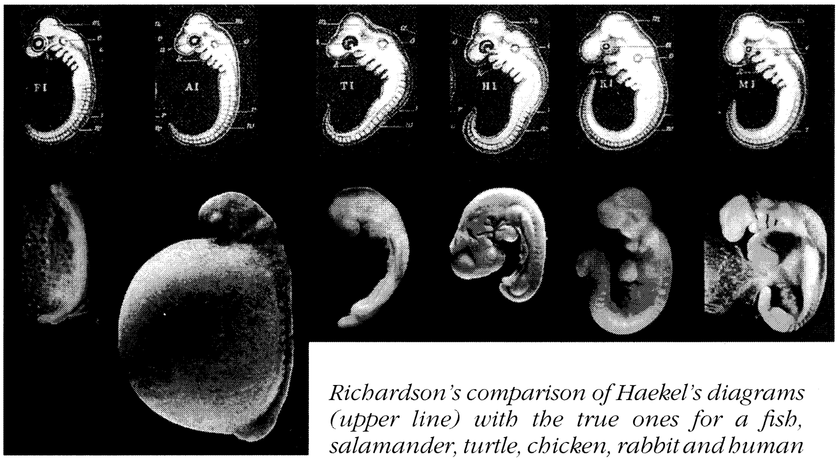
Another example quoted is the whale. A series has been found in the fossil record with gradual reduction in the back legs to the present day groups which have no legs. This is an example, not of evolutionary progression through the development of new structures, but rather the loss of complexity in design, a degeneration of the group. A similar example would be birds with wings that are reduced so that they cannot fly.

An important omission from textbooks are the many plants and animals known from the fossil record that have remained unchanged throughout their fossil history and some that have living representatives today. These are known as living fossils. According to the theory of evolution, changes to bring about new, more complex life forms are occurring randomly all the time by mutation and natural selection. From this it would be predicted that all life forms would be continually changing. However, we see unchanged forms persisting since early in the fossil record. Three examples are the horseshoe crab, *Limulus*, the cœlacanth and the maiden hair tree, *Ginkgo*.

The fossil record can be understood from models based on Creation and the Flood. The oldest fossils may be of life from before the Flood and the more recent fossils buried in the 'aftershocks' when more localised catastrophes occurred. These events preserved some of those plant and animal communities that had become established in the different environments emerging after the world-wide Flood. The order in which they occur in the fossil record reflect the different environments of the time and the different rates at which groups of plants and animals multiply and migrate. In general, mammals reproduce at a slower rate than reptiles, which have a slower rate than amphibia and finally invertebrates which have the potential to multiply even faster. This means that fossil invertebrates would be expected to occur first and mammals last in the sequence as all these groups recolonised after the world-wide flood.

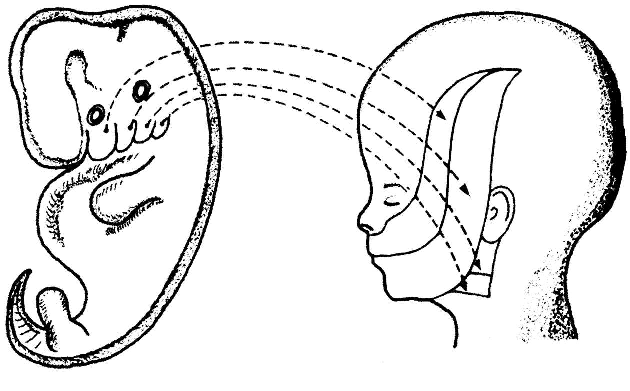
Embryology

Most textbooks refer to this topic as evidence supporting evolution. It was first put forward by Haeckel who suggested that embryological development retraces the evolutionary pathway of development of that group of animals. There are a few apparent parallels in development between embryos, but also many omissions, additions and inversions. Haeckel's diagrams were exposed as a fraud in 1874 by a university court in Jena, but no reference is made to this in textbooks.



Richardson's comparison of Haekel's diagrams (upper line) with the true ones for a fish, salamander, turtle, chicken, rabbit and human

The human embryo does pass through a stage when it looks very similar to a fish embryo and appears to have developing gill slits. However, these similarities are only superficial; these so-called gills never develop slits to enable them to function as gills and they are never involved in respiration as this occurs through the placenta. Instead these so-called 'gill slits' are involved in the development of key organs of the lower face and neck and are not vestigial in any way. Similarly, in early stages of development, other organs in the mammalian embryo are like those of fish, amphibians and reptiles. However, all stages of the embryo play a vital role in development including the simple kidneys and early two chambered heart. They are simple at first and increase in complexity



as the needs of the developing embryo increase. At no time are they non-functional or vestigial and so there is no evidence for the recapitulation of evolution.

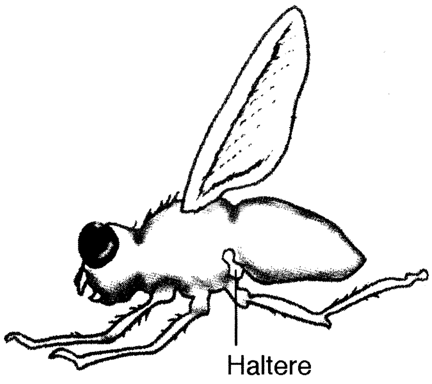
In plants a number of parallels in development are quoted as evidence for evolution. Firstly, the gametophyte generation of mosses and ferns is compared with filamentous algæ *e.g. Spirogyra*, suggesting that mosses and fern evolved from algæ. Secondly, the need for water in spore transfer to the unfertilised egg of cycads, the suggested ancestor of flowering plants, is compared with the need for water in fertilisation of mosses and ferns. However, the transfer is not comparable since the watery stage in cycads occurs within the wall structure of the ovule and not outside as in mosses and ferns. Similarly, the growth of the pollen tube to the unfertilised ovule in flowering plants does not provide a stage comparable to any in cycads, as it occurs within modified leaf tissue and not within the ovule wall as in the cycads.

The similarities in the examples given could be argued to be evidence for evolution, but can equally be argued as evidence for design. Animals with the same basic body plan of a trunk and four limbs could be expected to develop from a one-celled egg in a similar way at the beginning, with the differences developing later as the details of final structures differentiate. Similarly, parallels in plant structures show continuity of design with variations to provide suitability to different habitats and for diversity.

Comparative anatomy

A study of the structure of animals and plants shows that certain features are similar across a wide range of species and also at the level of the genus and family. For example, all animals with four limbs have limbs of the same basic design (the pentadactyl limb), even though they look different on the outside and are used in different ways, for swimming, flying, manipulating, digging and running. These are known as homologous organs, the same basic structure, with the same embryonic development and body position. Textbooks argue that if organisms are descended from a common ancestor they would be expected to share basic features in common. Other examples are the bones that make up the jaw of fish, the jaw and ear bones of amphibians, reptiles and mammals; the wings of insects; insect mouthparts; and the various modifications of the seeds in plants to aid dispersal. From the basic plan, variations are considered to be adaptations to different environments and modes of life during the process of evolution.

Some textbooks argue that if plants and animals had been created then each design would have been different, a chaotic variation of forms. However, it can equally be argued that a common basic structure with variations in the finer points of design demonstrates the involvement of a designer. Here we can see the general design adapted for a range of situations in an organised and systematic fashion, such as is seen in car design. In some cases intricate variations of the basic design show different, complex design features, such as the halteres of flies *(Diptera)* which have been modified as gyroscopes to maintain balance in flight, but in addition involve the new design feature of re-routing of the nerve impulses from the eyes to allow for very rapid alteration of flight direction.



Organs of very different structure that serve the same purpose, for example the wings of insects and birds, are said to be analogous. Textbooks say that these have evolved separately for the same purpose. The probability that such complex structures could evolve by chance through the stepwise addition of mutations is extremely low. The suggestion that it happened more than once would further reduce the probability of either event occurring. The creation of different designs to achieve the same purpose is entirely in keeping with a world designer producing such a diversity and complexity of life. From the observations of these homologous and analogous organs alone, it is not possible to deny or prove either evolution or creation. However, no mechanism for the evolution of the new design features has been shown so there is no support here for evolution.

Mutation and natural selection are offered as the mechanisms for evolution from one type of plant or animal to another. However, no mutation is known that has added information to a gene or given rise to a new gene with novel information. Textbook examples of mutation, sickle-cell anæmia, antibiotic resistance in bacteria, warfarin resistance in rats, involve reduced specificity of design rather than an increase; in other words loss of information from the gene. For example, resistance to antibiotics is achieved by reducing the specificity of the active site so that the antibiotic can no longer bind to the site on the enzyme involved. This means that the antibiotic no longer has any effect on the metabolism of the bacteria, but also that the normal metabolism of the bacteria is compromised. In the absence of the antibiotic, these types compete less well than the general form. These processes may account for minor changes within groups of plants and animals, but provide no evidence for the appearance of new designs. This is a major challenge for the theory of evolution.

Vestigial Organs

Vestigial organs are given as evidence for evolution. These are structures with no apparent function now, but they are thought to be left-overs of organs which were important in their evolutionary ancestors. In older textbooks, large numbers of examples were quoted, now there are only about four to eight features quoted for humans. These are the human appendix, the caudal vertebræ (coccyx) found at the bottom of the spine, the segmented muscles of the belly which are analogous to the segmented bodies of worms, body hair, muscles around the ear and nose, the third eyelid or nictating membrane which occurs in connection with the tear duct, the canine and wisdom teeth and the human yolk sac.

Some of these organs now have known vital functions in the human body and there is no need to explain their existence by past evolutionary history. For example, the human appendix, although not concerned with digestion, is an important part of the immune system. The coccyx serves for the attachment of muscles of the bowels and for padding when sitting down. The yolk sac is important for gas diffusion of carbon dioxide and oxygen while the umbilical cord is developing. We do not know the function of all the other structures, but as a large number of former examples are now found to be important, ignorance and not obsolescence may be the situation. For others, variety and beauty are key features of the world and a purely functional explanation may not be needed.

Taxonomy/Classification

The system of classification of living things is little changed since it was proposed by Linnæus. Plants and animals are grouped on the basis of structural similarities, for example, all animals with backbones are classified together, as are all flowering plants. This system was based on groupings of similar types at the level of species, genus, family and above and was developed before the modern theory of evolution had been proposed by Darwin. However, since general acceptance of the theory, these similarities are taken as evidence and an inevitable consequence of evolution. It is implied that the alternative, that all species were created separately at a specific time, is not supported by the evidence.

Linnæus set out to classify plants and animals at the level of originally created kinds as described in the Bible. However, there is no description available of the original kinds or how much variation was built into any one kind. All we know is that these kinds would reproduce faithfully to type, so it is reasonable to assume that there was no interbreeding between kinds. His decision about the level of classification was based on the assumption of the day that one animal or plant was the same as any other of the species and contained no variability. Since the time of Linnæus, the variation within groups of plants and animals has been more fully appreciated together with its genetic basis. The difficulty in trying to establish the limits of the original kinds that were created is enormous. Firstly, the climates and soils and the distribution of land, mountain and sea are entirely different and likely to have affected breeding patterns. Secondly, it is thought that over 90% of the plants and animals known from the fossil record are now extinct. The remnants will possess only a fraction of the original genetic material and this may affect the ability to interbreed.

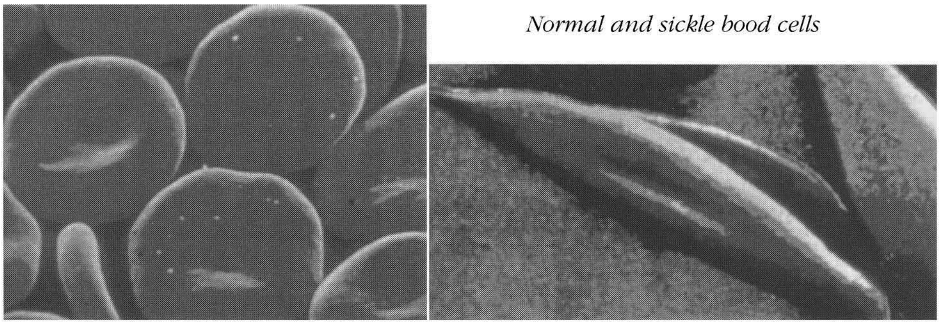
Belief in creation does not include the belief that species were individually created. The originally created kinds might equate with species in some groups, but more likely with the level of genus or family for others. There are no standardised criteria for classification at the species, genus or family level in biology. Indeed, the concept of species is defined as that described to be so by a competent taxonomist.

The hierarchical system of classification with kingdom, phylum, class, order, family, genus and species shows ordered design of groups within groups. The possibility of such groupings evolving but leaving no traces of intermediates at any level is very remote. This evidence supports a purposeful created origin for plants and animals.

Population Genetics in Nature

Examples are given in textbooks of changes in species that have occurred over time. These are referred to as evolution in action. The peppered moth is one example. Both dark and light forms have always existed. However, the proportion of dark coloured has changed. As the soot deposits covered the resting sites in industrial areas, the dark forms were less visible to predators and so the proportion of this type increased. With the decrease of pollution the dark forms were more easily picked off and the proportion swung in favour of the lighter forms. No new genes have been formed and no new features have developed. Therefore no step along the evolutionary pathway has been demonstrated and no evidence for evolution.

Another example quoted is sickle cell anæmia; in the heterozygous condition individuals are less susceptible to malaria. A change in the biochemical composition of the hæmoglobin means that it is not as well adapted to transporting oxygen as the ordinary type. Once the hæmoglobin has given up the oxygen to the cells, it precipitates out and the red blood cells collapse into a sickle shape and can block the capillaries. This change has come about by a loss of information on the optimum composition of the hæmoglobin molecule. Although individuals are better adapted to an environment with



Normal and sickle bood cells

malaria, this is not a step along the evolutionary pathway because rather than demonstrating the addition of new information needed for the evolution of new designs, it demonstrates a loss and downward progression in the efficiency of oxygen transport.

Plant and animal breeding

Breeding programmes demonstrate the in-built variability within species. Over several generations, different characteristics can be enhanced or diminished. This process mimics selection in natural environments, but occurs at a much faster rate as the breeders select just a few individuals for survival to the next generation. For example, breeding in sugar beet has increased the percentage of sugar content in the beet to about 20%. However, no further increase can be achieved. Inbreeding and then out-crossing lines can increase vigour, for example in corn and some varieties of cabbage, but does not involve the production of new information, just a reshuffling of the old.

Therefore, breeding does not provide evidence for evolution, just the capacity of man to reshuffile the genes already in existence to maximum advantage.

Molecular Biology

The cells of different organisms are remarkably alike in their biochemistry and fine structure. Nucleic acids, ATP, cytochrome and certain organelles are found right across almost the whole plant and animal kingdoms. Textbook suggest that this 'supports the view that all living things have had a common ancestry'.

Organisms which share more biochemical features in common are concluded to be more closely related. The most quoted example in textbooks is cytochrome c; similar arguments apply to other chemical constituents of the cell. The fewer the differences between the molecules in any two species, the more closely related these organisms are taken to be. The chemistry of this molecule is now known in a wide range of plants and animals and a 'family tree' has been drawn up by comparing how many changes must be made for the molecule in one organism to become the same as in another. The number of changes from horse to fruit fly is greater than that from horse to turtle, which is greater than that from horse to dog. The tree is similar to the one based on anatomical features. It can be argued that these two results support one another, making a strong case for evolution or equally it is possible that the similarities and differences in both biochemistry and anatomy are a reflection of the similarities and differences in lifestyle. Comparable lifestyle and body structure would also explain the similar patterns of behaviour seen between animals. For example, the way a young chimpanzee and young human babies are held when nursing is very similar. Evolution is not the only possible explanation. It is equally valid to conclude from the similarities that all were the products of the same designer. Neither view can be proved or disproved without observing the process in action.

However, another feature must be mentioned. In the cytochrome c analysis, each identifiable subclass is quite distinct and isolated from each other subclass. No intermediates exist. No member of a group can be considered more primitive or more advanced than any other. There is no evidence of individuals gradually forming a line of evolutionary progression to another group. All the sequences of a subgroup are isolated to the same extent from members of another subgroup. A total absence of intermediates presents a serious challenge for the theory of evolution.

A comparison between the cytochrome c of the bacterium and a variety of other species show that they are all almost exactly the same distance apart, rather like the seats on a 'Big wheel' at a fair ground. In other words, each animal and plant is as different from a species of bacterium as any other. A similar pattern is seen when comparing at a lower taxonomic level, for example between the silk moth and either the horse, pigeon, turtle, carp or lamprey. Evolutionary theory would predict some to be further away than others, for example, invertebrates, fish, amphibians, reptiles and mammals to be progressively further away from the bacteria, because it would be expected that they had taken longer for the greater differences to evolve.

This amazingly ordered arrangement of life forms with the complete absence of intermediate forms is entirely unexpected from an evolutionary point of view and favours logical design rather than gradual progression through evolution.

Conclusion

Biology provides an interesting insight into the changes in life forms over time. However, there is no evidence of the mechanism for the development of new structures. This is necessary to prove evolutionary progression from simple to complex. Some details in biology textbooks are of no help in deciding which view of origins is more likely to be correct. Some evidence strongly points to origin by the purposeful design of a Creator.

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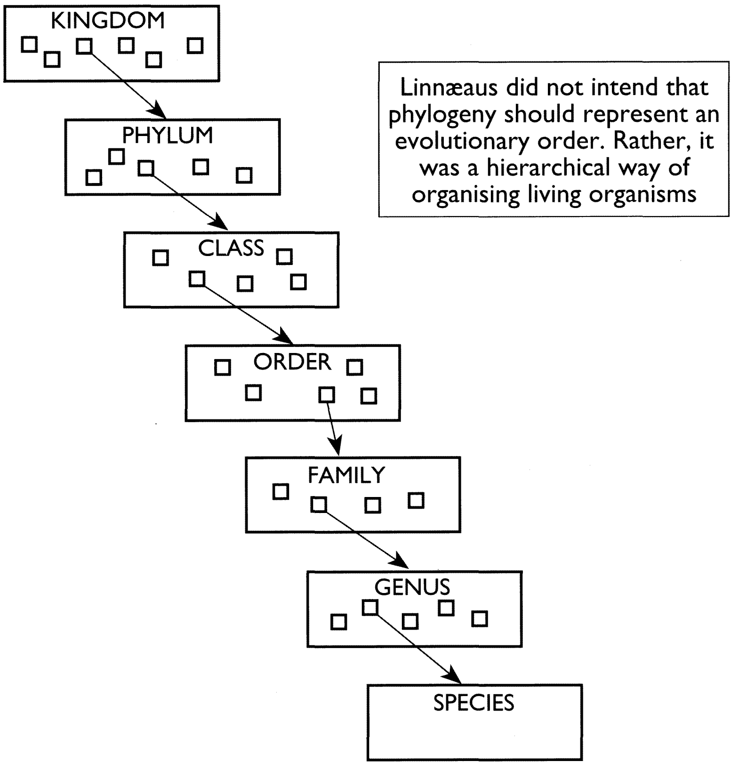
The Limits of Variation

Eoghan Mhor

BY the mid-nineteenth century, natural historians were finishing cataloguing the world's fauna and flora. Never before had there been such an intense exploration of the world's plant and animal kingdom. Within this growing catalogue of nature/creation the science of classification developed. This sought to place animals and plants into similar groups. Within these groups there were groupings and within these groups still smaller groupings, much like a Russian doll.

Linnæan taxonomy arranges organisms into groups. Like Russian dolls, the species fit within the larger genus, which in turn fit in the larger family, right up to the kingdom



Linnæaus did not intend that phylogeny should represent an evolutionary order. Rather, it was a hierarchical way of organising living organisms

Figure 1

The smallest of these groups was the species. From this basic unit, larger taxonomic units were formed. As the naturalists catalogued plants and animals, they noticed small variations within a species. Whilst not dramatically altering the definition of the basic species it did indicate that there was a degree of variation within a species. Indeed variation within a species is still considered important enough to be included in the Standard Grade Biology syllabus. This variation in outward appearance was becoming increasingly evident by the mid 19th century. Darwin drew upon this variation as the raw material of evolution.

One of the issues arising as classification progressed was the status of the 'species'. Could it change? Initially Linnæus (1707–1778), the founding father of classification (see figure 1), was of the impression that species were created by God and did not change (Brooke,1974 a). As his studies progressed however, he changed his opinion and by 1767 could write of creation at the order level and God mixing and multiplying these to produce genera and species (Andrews,1986). This has largely been forgotten; it does however receive acknowledgement in the Open University course book *Unit 12—Precursors of Darwin*, (p.17). Were they to try to illustrate Linnæus's proposal, it would look something like figure 2.

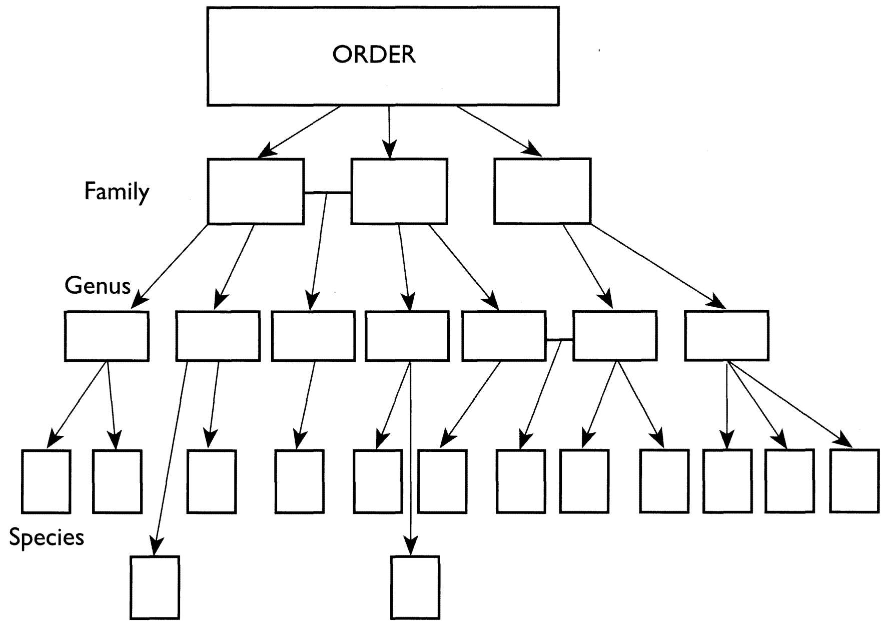
It is interesting to note that Darwin's thesis on evolution was entitled *The Origin of Species*. Had he read the letters of Carl Linnæus of 1767, he would have read an outline of God creating plants in a few large orders from which had descended genera and species! Carl Linnæus had already postulated that many groups of plants were descended from a few created orders (see figure 1)! While Linnæus speculated about the descent of plants, Darwin was speculating about the ascent of man.

Speculation about the potential of variation in nature (creation) was fueled by the development of true breeding strains of domestic animal. The Comte de Buffon (1707–88) in his *Histoire Naturelle* (1749) observed that within a single species there were variations in form (Brooke, 1974a). To find those variations in plants, he observed that

> 'only by sowing and rearing an infinite number of vegetables of the same species, that it some individuals were recognized to bear more succulent fruit than others.'

Similarly, in the case of the domestic hen and pigeon, he noted that

> 'a great number of races have been lately produced, all of which propagate their kinds.'



Linnæan Descent – a possible origin of plant diversity. A created order develops into families, which in turn produce genera, these in turn generate species

Figure 2

For the natural historian of the late 18th century there existed the possibility of improving any animal or plant by selecting those with the best characteristics. This was fundamental to Darwin's thinking. The first chapter of *The Origin* and the first part of his 1844 essay (Brooke,1974b) were devoted to the power of human selection in domestic breeding. Could minor changes over a long period of time cause transformation from one animal into a totally different animal?

It is important to realize that Darwin had no knowledge of genetics, as we understand it today. He was speculating about an observable phenomenon. What we must ask ourselves is whether he was right? Is there an infinite amount of variation that could transform one kind of organism into another?

Genetics

Speculation based on observable changes over time, led Darwin and his successors to believe in the possibility of changing a monkey into a man. Darwinians held that small variations in a species could, through natural selection transform one organism into another, by incremental changes.

Without a knowledge of inherited characteristics, Darwin and his contemporaries held to the idea of offspring receiving half their 'blood', from each parent a quarter from each grandparent an eighth from each great grandparent, etc One of the objections to a steady progress was that with each generation, the characteristics would be diluted to the point where they were ultimately negligible.

When the infant science of genetics became established, this did not immediately provide an answer for Darwinians. Indeed the rediscovery of Mendel's laws of heredity did not immediately reinforce Darwin's theory. On the contrary they placed it in a partial eclipse (Stebbins, 1966). Two events fuelled the scepticism. Firstly, the discovery by de Vries of new types of the evening primrose which had appeared in a single generation. Secondly, the experiments of Johannsen, who, from a single variety of garden pea, selected for the extremes of size. In the first generation he was able to produce larger and smaller peas. Subsequent generations however were not improved.

Together these discoveries led to the proposal of rapid change as the mechanism of evolution. With hindsight, we can see that the changes in the evening primrose were the result of peculiar chromosomal segregation and the garden peas were simply limited by the number of alleles present in the population (still a valid objection).

The discovery of genetics was initially a setback to the theory of evolution. Properly understood it still is. Variation was grounded in genes, which followed mathematical rules. There were different forms of a gene called alleles. Some of these might exhibit a characteristic called dominance, which means they can mask or hide other alleles, which are described as recessive. This explained why some characteristics, such as red hair, could skip a generation (or several generations) to reappear 'out of the blue'.

Today we identify existing variation in two forms: that which is outwardly observable and that which is hidden in the genes. Biologists such as Darwin worked with externally observable variation. Today geneticists can go further and probe the hidden genetic variation.

With an increasing knowledge of the mechanism of inheritance it has become possible to estimate not only the obvious (dominant) alleles but also the hidden (recessive) alleles. Gel electrophoresis looks for differences at the biomolecular level rather than the obvious outward variation (phenotype). This technique has shown there is a huge reservoir of variation, much more than was previously believed possible (5–15% heterozygosity; Lester and Bohlin, 1984). This variation is already present in populations. We tap into it when we, or nature, breed new strains. One of the effects of selecting for certain alleles is that we select against others, as a consequence variation is reduced. This has happened in pedigree dogs and in the cheetah. For pedigree dogs they may lose coat colour : Alsatians do not have spotted coats! For the cheetah it has removed almost all genetic variation, making skin grafts between different cheetahs possible. The converse is that as we go back in time, genetic variation increases! (See figure 3). For example the dove and raven from Noah's Ark, have given rise to all the varieties of dove and raven we see today.

We can conclude then, that variation among species today is very high and was even higher in the past. This is totally compatible with Scripture and the development of races (human and animal). It is a fleshing out of the proposition of Linnæus that modern species were possibly descended from created orders.

The source of variation—the crucial question

The Higher Grade Biology syllabus gives two sources of variation independent assortment and crossover (Torrance, 1991). I have puzzled over this because neither produces new genetic information. Independent assortment basically means that like a pack of cards being dealt out there are new combinations. So chromosomes are reshuffled to produce new combinations. To Darwin looking at the outward appearance there is genuinely new variation. For the modern geneticist it is merely a re-shuffling of existing chromosomes.

Even crossover produces new combinations rather than new variation. It does so at a different level however. You may have seen cards which comprise a head, body and legs. Children have much fun swapping bodies and heads to make silly combinations. Crossover in a similar way breaks chromosomes and swaps them over recombining existing genes.

Genetic variation is vital for evolution, unless there is a way to create new genetic information there is no way evolution can work. Natural selection will be limited by the existing (created) variation. This leaves but one option to the evolutionist—mutation.

Mutation

It is impossible to discuss adequately all the different types of mutation but, for the sake of brevity, I will try to cover the basic principles. There are many types of mutation, but most evolutionary textbooks openly admit most mutations are harmful. The beneficial ones which are left, are rare and typified by the following examples.

Sickle Cell Trait

Of the mutations which do show benefit, the most frequently quoted is sickle cell anemia. In Africa it is 'selected for' because it does confer some resistance to malaria. In America it is 'selected against' because it is a harmful genetically inherited disease. It is an allele of the original hæmoglobin gene which has one base altered from T (tyrosine) to A (adenine). This results in a less 'fit' form of hæmoglobin which is less efficient at carrying oxygen. In a heterozygous individual it does however, confer some resistance to malaria. It is what I would term a 'derivative allele'. It has been derived from an existing gene, it is not an improvement on the original hæmoglobin gene.

Webbed paw

Another example is the webbed paw of the Newfoundland dog. In the formation of the digits, there is a webbing between each, which disappears in a programmed death called apostasis. If the gene which initiates this cell death is removed, then the webbing remains. This happens periodically when children are born but surgery quickly removes the webbing. At some time the Newfoundland has suffered a mutation to the gene(s) governing this process and as a result a new allele has been formed, a derivative allele.

Some of the variation present in the ancestors of the domestic dog

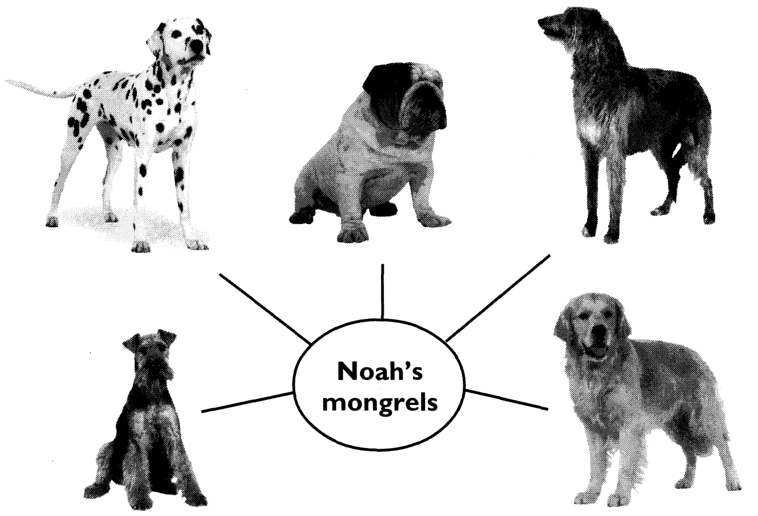


Figure 3

In both cases there has been no increase in genetic information. Rather damage at the genetic level is being inherited. The damaged form of the genes is called alleles. It is possible to produce new alleles but not new genetic information! This was the question, which was put to Professor Richard Dawkins in the video *From a Frog to a Prince*. He could easily have given examples of alleles produced by harmful mutation but genuinely new genetic information is much more difficult.

The closest we come to seeing new genetic information is when bacteria are put through the Ammes Test. In this experiment bacteria unable to digest a substrate undergo a mutation and can digest the substrate. A functional enzyme would appear to be produced by mutation. Actually, the alternative name—'Reversion Mutation'—is a better description (Rothwell, 1993). In essence it involves the repair of an existing gene (or allele). Repaired damage is of course of no use at all to the evolutionist!

Is the theory falsifiable?

Evolutionists have charged creationists with being unscientific because our theories are not falsifiable. This means that our theories cannot be proved correct or false. This is untrue! As we have already seen, mutation does not produce genetic variation. This leads us to propose the hypothesis that conservation of genetic variation is more important than mutating genes in the laboratory. Evolutionary biologists flirt with this idea when they make statements such as,

> 'Most of the genetic variation found in populations stems not from the occurrence of new mutations in each generation, as believed by classical Darwinists; rather it is generated through recombination.' (Rothwell, 1993, p.327)

Creation would also have implications for genetic engineering. If Linnæus was correct in his identification of the original created 'kind' with the taxonomic level called the Order, several things follow. Plants descending from the Order are related. The genetic variation they possess can be traced back to the genetic variation of the original 'kind'. Citrus fruits for example are descended from an original citrus tree 'kind'. From that first kind of citrus tree we now have lemon, orange, tangerine, lime and grapefruit trees. Genetically, they have a common heritage. The isolated gene pools we see today were once deeper and part of one large loch (or lake). As time went by the lake became shallower and fragmented.

Applying this to genetic engineering, we can say that transferring genes within a created order should not be dangerous; the genes were once freely exchanged. To carry out genetic engineering between different 'kinds', however, is a different thing altogether. These gene pools were never in contact! Evolutionary theory however makes no distinction. For the evolutionary biologist there is no qualitative distinction between transferring a gene from grass to barley (within a kind) and transferring a gene from a fish to a strawberry (between a kind).

Summary

1. As Christians we can see the providence of God in the gracious provision of created genetic variation. It has enabled creation to adapt to the changes wrought by the Fall and the genetic bottleneck of Noah's Ark.
2. Animals and plants are likely to have changed over time. What taxonomy currently calls species, are almost certainly related to each other through a created kind and were at one time part of a single gene pool.
3. Linnæus, a creationist biologist was speculating about the origin of species and genera within a Creationist framework before Darwin.
4. Darwin is following in the steps of Linnæus when he speculates on the origin of species but outside of a christian framework arrives at a very different conclusion.
5. Modern molecular biology can demonstrate the origin of derivative alleles. It has, however, failed to demonstrate the origin of genuinely new genetic information.
6. Genetic variation has been higher in the past. It is becoming less, which is one of the reasons behind gene banks, which seek to conserve (created) variation.
7. Creationists see a qualitative distinction between gene transfer within a 'kind' and between 'kinds', the former presenting a very low risk, the latter an unknown and potentially very high risk.

I realise that the concept of created alleles as distinct from derivative alleles is a new concept to most readers. It is one of the areas currently under research and will be the subject of a forthcoming paper.

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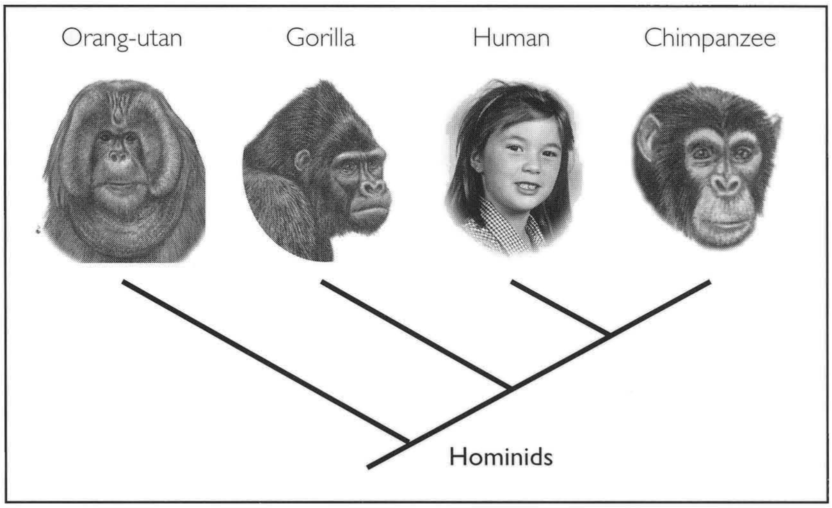
Ape-Men and the Quest for Human Origins

David J. Tyler

THERE can be few fields of enquiry that can match the 'origins of humanity' for media attention, heated debate and sustained public interest. Headline-making discoveries occur every year, and there is no drying-up of books and magazine articles published to satisfy the appetites of readers. Not so prominent, but nevertheless an ever-present consideration, is the impact of all this on the way we think about purpose and meaning in our lives, and about our relationship with God. If man is a special creation of God, then the consequences are quite different from those which follow if man is the product of Darwinian evolution.

Before addressing the issue of human origins, it is worth thinking about the origin and geographical distribution of the various races of mankind. There are clearly people with different physical characteristics in the world, but what is not so clear is how they came to live where they do. How did Negroid people, for example come to live in the North American continent? How did Caucasian people come to live in South Africa? If it is possible to turn to historical records, the picture very quickly can become clearer. However, without these records, speculation can be rife. For example, in the news recently have been reports of archæological finds that have been regarded as 'culturally sensitive'. Was the 'oldest' American a Red Indian? Was the oldest Chinese a Mongoloid? The lack of historical records makes it very difficult to resolve these puzzles.



These racial differences are all regarded as superficial variants within Homo sapiens. But what happens if we go back further in time? Where did humans come from? What account of the origin of the human race do we pass on to our children? When we are unconstrained by historical records, there is plenty of scope for speculation.

The evolutionary Framework

Nearly all contemporary thinking about human origins is influenced by evolutionary thinking: we must have evolved from ape-like ancestors. This basic presumption is supported by three major lines of evidence:

Comparative anatomy. The Great Apes are the closest animals to humans among the Primates. Debate has focused on the question: are we closer to gorillas, chimpanzees, gibbons or the orang-utans?

Molecular biology. DNA comparisons have shown that genetically we are 97% ape and closest to the chimpanzee.

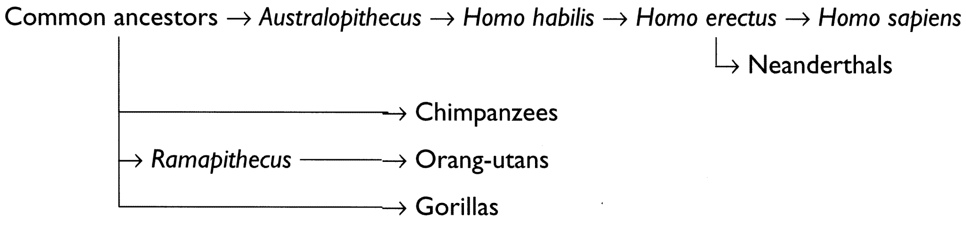
Fossil data. An intensive search for hominid bones has led to a steady stream of discoveries. Most of the finds are fragmentary. In their discussions, scholars make frequent reference to hominid brain capacity and to the dental arch, both of which are deemed important in tracing the evolution of man from ape.

It is worth emphasising at the outset that this evolutionary framework is *assumed*, not demonstrated. The scholars working in this field are not willing to allow a non-evolutionary explanation. Most of them regard any other approach as alien to science.

Overview of the evolutionary pathway

A picture has emerged over the past few decades which reveals something of a consensus.

There are numerous species of australopithecines and much of the debate has raged over their relative importance. Whenever palæontologists have discovered minor variations in the set of characters that make up a species, they have claimed, with great fanfare, the discovery of a new species. This well-known tendency towards 'taxonomic splitting', as it is called, has made it quite difficult for non-professionals to follow developments. However, things usually become clearer after the novelty of the discovery has worn off.


Common ancestors → Australopithecus → Homo habilis → Homo erectus → Homo sapiens
→ Neanderthals
→ Chimpanzees
→ Ramapithecus → Orang-utans
→ Gorillas

The fossil record, it has been said, exhibits 'punctuated equilibria': that is, there are distinct species (rather than gradual changes in morphology) and these species have co-existed (with overlapping timescales) (Eldredge & Tattersall, 1982). Thus, the hominid fossil record is non-Darwinian. It is not a matter of dispute that some of the species are genetically related; but are they all linked by common ancestry? The most important question is: does the hominid fossil record portray a genuine evolutionary transition from ape to man? This is the question we now seek to answer.

The Fossils

Ramapithecus

Ramapithecus is an instructive starting point because this species used to be regarded as the first step on the road to human evolution. The animal had a short muzzle (flat face), teeth with human affinities, and was thought to have an arcuate shape of the dental arch.

A major change came with the finding of a similar species *Sivapithecus* in large quantities in Pakistan. The link with orang-utans then became obvious to anthropologists. Lowenstein and Zihlman (1988) wrote: 'After 20 years of spirited defence, [the anthopologists] have abandoned *Ramapithecus* as a human ancestor … On the basis of the same fragments of bones and teeth that misled them before, the palæontologists now proclaim that *Ramapithecus* is an ancestor of the orang-utans.'

When only fragmentary material was available, it was possible to elevate *Ramapithecus* into the role of human ancestor. However, change came with the discovery of better preserved material. This case allows us to formulate a first rule of human anthropology: 'Fragmentary fossil material cannot be given great weight'. This rule will be used later in our consideration of other data.

Australopithecines

The quantity of fossil material for the australopithecines is now relatively good, although some critical areas are under-represented: notably the junction of the skull with the neck vertebræ, and the pelvis. Generally agreed features make it clear that the animals were ape-like, and this is expressed in the generic name which means 'Southern Ape'. They were vegetarian animals, as shown by the wear patterns on teeth enamel, which is very similar to that of modern chimpanzees (Leakey 1981, p.74).

Significant affinities with the apes are:

- small brained (400–700cc, very similar to chimpanzees)
- large skull ridge
- eye/forehead profile
- mouth/jaw characteristics
- protruding jaw
- short stature

Significant affinities with human beings are:

- dentition
- possible bipedalism

These few human affinities have made the australopithecine fossils very important in studies of human ancestry. The first fossil find, of the Taung skull, by Raymond Dart in 1925, belongs to an immature animal. Since infant apes resemble humans a great deal more than adults, the human affinities have tended to be over-emphasised.

The best-known example of an australopithecine is Lucy, discovered in 1974 by Johanson and classified as *Australopithecus afarensis*. Lucy was a chimpanzee-shaped ape with a brain capacity of 400 cc. She is often heralded as a good example of an early bipedal hominoid.

Oxnard's systematic analysis of morphology led him to question the relevance of the australopithecine material to human evolution. In 1987 he wrote:

> 'In each case, although initial studies suggest that the fossils are similar to humans, or at the worst intermediate between humans and African apes, study of the complete evidence readily shows that the reality is otherwise. These fossils clearly differ more from both humans and African apes, than do these two living groups from each other. The australopithecines are unique' (p.227).

Oxnard has been criticised by many anthropologists, who argue that his studies do not do justice to the complex shape of certain bones, nor to their relative importance for understanding locomotion. There is some validity to these criticisms, and it would be wrong to place too much emphasis on statistical studies. However, Oxnard's great contribution was, in my opinion, to emphasise the importance of looking at the whole animal rather than focusing attention on the details. It seems to me that much modern work over-emphasises the detail and the larger picture is obscured. On these grounds, Oxnard's work can still be defended.

A store of *Australopithecus africanus* skeletons has become available for examination during the 1990s, with surprising results. Researchers have concluded that the proportions of *africanus* were more apelike—and perhaps more suited to a life in the trees—than those of *afarensis*, its presumed ancestor. The body proportions were very close to those of a chimpanzee, with long arms and short legs. This makes the 'descendant' more 'primitive' than the 'ancestor'! Lee Berger of the University of Witwatersrand is quoted as saying: 'One might say we are kicking Lucy out of the family tree'. According to Shreeve (1996), these new *africanus* finds are 'placing a kink instead of a link into our lineage's passage from "ape" to "man".'

Homo habilis

Distinctive features of *Homo habilis* are large brain size, teeth with human affinities, and an association with stone tools. This link with stone tools has led to the bones being given the Latin name for 'Handyman'.

The evidence for *Homo habilis* is fragmentary and controversial. Knowing this, we can apply the rule about not making too much of fragmentary fossil material. As might be expected, interpretations of *Homo habilis* do not show consensus. Some anthropologists would regard some habiline material as australopithecine (Stringer and Gray, 1983). The talus of *habilis* specimens were found by Oxnard (1974) to fall in the australopithecine range. Eldredge and Tattersall (1982) comment as follows:

> 'But whether we are dealing with one species, or two, or many, is difficult to tell. And without a reasonable ability to distinguish between species, we would be unwise to attempt to infer pattern. For the present then, we would choose to retain Homo habilis as a species of convenience, a term useful for identifying a particular suite of fossil material, but to which we would not attach an inordinate amount of biological significance.' (p.140)

Where more complete fossil material has become available, the picture has become clearer. Berger is quoted (Shreeve, 1996) as noting that 'the only two known partial skeletons of *Homo habilis*, the earliest member of our genus, also have more apelike body proportions'. Wood and Collard (1999) have re-examined the genus *Homo*, and have concluded that *Homo habilis* does not match the criteria for belonging to the genus. As a 'missing link' *Homo habilis* is unconvincing!

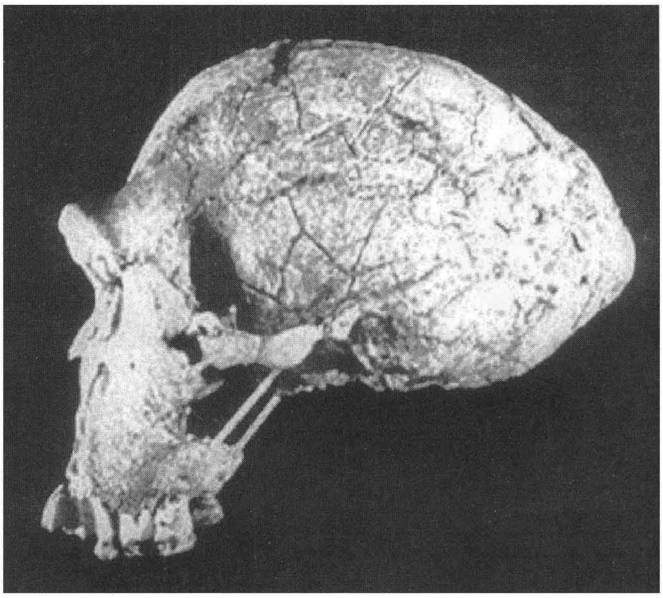
Homo erectus

These fossils have considerably larger cranial capacities (in the range 900–1150 cc), and are sometimes associated with tools and with fire. Bones of *Homo erectus* are geographically widespread. Studies of teeth enamel wear have suggested that *erectus* was an omnivore (Leakey 1981, p.75).

Leakey (1981) describes the general characteristics of *Homo erectus* fossils:

> 'From other fossil material that has been unearthed, it is clear that the skeleton of *Homo erectus* was essentially modern. A little stockier than the average human today, perhaps, but not all that different. The head and face, however, were still 'primitive': the forehead sloped backwards and was mounted with prominent brow-ridges, while the brain, though larger than that of *Homo habilis*, was only 70% of the size of a *Homo sapiens* brain. The face protruded less than in *Homo habilis*, but was not as flat or 'tucked in' as in *Homo sapiens*. The chin that is so characteristic of modern humans was present but poorly developed.' (p.110f).

In 1984, a new skull was found by Alan Walker and Richard Leakey by Lake Turkana in Kenya. It was the skeleton of a 12 year old male, 5ft 4in tall, with a brain size of about 850cc, and the almost complete skeleton showed he walked fully erect (Leakey, 1985). Numerous affinities with human skeletons were noted. Walker asserted close similarities with Neanderthal Man (the large brow ridge and sloping forehead). However, after further analysis, it was not classified as Neanderthal Man, but as *Homo erectus*.



Richard Leakey (1981) has reconstructed several graphical scenes to portray *Homo erectus* in the real world. Readers may be surprised at their appearance, as one has to look hard to realise that there are significant differences from modern man. Some analysts consider that *H. erectus* and *H. sapiens* are one and the same species (Andrews, 1984).

The cultural remains of *Homo erectus* are important and have not received the attention they deserve. There are temporary hearths, evidences of hunting and cutting up prey, and the tools were simple because they were made to meet immediate needs and then discarded.

A more recent study of *Homo erectus* material (Rightmire, 1990) has concluded that a coherent species has been identified, but that gradual transformation of *Homo erectus* into *Homo sapiens* is not supported by the evidence.

Homo sapiens

Numerous skulls are known (dated less than 400,000 years old) which are said to be 'definitely not' *Homo erectus*. These skulls have large faces, heavy brow ridges and long crania. They are typically thick boned. The associated stone tools are usually Acheulean (flake-based).

By contrast, modern man typically has a small face with a large forehead, an almost non-existent brow ridge and a high, well-inflated cranium. The skull is thin boned and delicately constructed. Consequently, the ancient skulls are said to come from 'archaic *Homo sapiens*'. The cultural associations are few, but those that do exist support the idea that art and craftsmanship were present.

Later, generally dated at about 35,000 years ago, modern man is found: this is Cro-Magnon Man, best known for his inspiring cave paintings.

Homo neanderthalis

Neanderthal Man has had a chequered history. The earliest reconstruction made him a stooping, hairy ape-like figure, somewhere transitional between apes and men. When it was found that the bones belonged to an aged infirm individual, the official story changed, but the popular image lived on. Neanderthal Man should be perceived now as a robust form of man who was adapted to living in harsh environments. The skeletal features which make him distinctive to anthopologists would not necessarily make him stand out in crowd:

> 'If he could be reincarnated and placed in a New York subway provided he were bathed, shaved and dressed in modern clothing it is doubtful whether he would attract any more attention than some of its other denizens.' (Leakey, 1981).

Although it has been known for some time that Neanderthals buried their dead, with ritual, it has generally been thought that they were culturally barren. However, in recent years, Neanderthal have been associated with a variety of human cultural remains. In addition, several sites are known where Neanderthal bones are found alongside those of modern man.

Perhaps the most dramatic recent find (reported in the media in April 1999 and published by Duarte *et al*., 1999) is that of a skeleton interpreted as a Neanderthal/*sapiens* hybrid. The skeleton, thought to be that of a four-year-old boy, was found when an archæologist explored a rabbit hole near the coast north of Lisbon. The child had been given a ritual burial, with red ochre and pierced shells. He had the pronounced chin and teeth of modern humans, but his sturdy limbs were more characteristic of the Neanderthals.

The Basic Type approach to mankind

The literature on human ancestry is dominated by the belief that an evolutionary lineage from ape-like animal to modern man is there to be found. Everything is discussed in relation to this basic interpretative framework. Professor David Pilbeam (1980) of Harvard University, has made the following remarks:

> 'Our theories have often said far more about the theorists than they have about what actually happened. Virtually all our theories about human origins were relatively unconstrained by fossil data ... The theories were fossil-free and in some cases even fossil-proof. Many evolutionary schemes were in fact dominated by theoretical assumptions that were largely divorced from data derived from fossils.' (pp.262, 267).

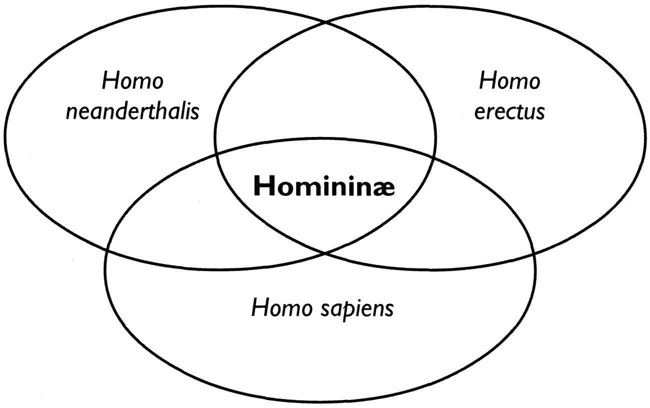
This is a mistake we do not want to keep making! We are now able to formulate a second rule of human anthropology: 'An adopted interpretative framework must not be allowed to shoehorn data'. Force-fitting the evidence to fit the evolution model has been, and doubtless will continue to be, a major problem. This alone justifies an approach to the data which considers other interpretative models.

One alternative way of looking at the data is based on the idea that the biological world can be analysed in terms of distinct Basic Types that are genetically related. We talk about the dog family, the cat family, the camelid family, and so on. Genetically, there are strong indications that the species that make up these family groups (for example, dingos, jackals and wolves within the 'dog' group) are related, but the evidence for genetic links outside the family is sparse. Can Basic Type thinking be applied to the 'human' family? Is there a pattern in the fossils that is similarly discernible? These questions are worth asking. Instead of assuming an evolutionary relationship, the appropriate methodology should be to evaluate the data from within alternative models.

The Basic Type biology approach has been used in the context of human fossils (Hartwig-Scherer, 1998). The pattern that emerges is that there is a strong basis for extending the human family beyond *Homo sapiens*. 'Because of a comparatively unique combination of traits within the Basic Type Homininæ, the Pleistocene hominid fossils, in contrast to the other fossil hominoids, can be easily assigned to the Basic Type Homininæ.' (p.220). The resultant picture is given below. *Homo erectus*, *Homo neanderthalis* and *Homo sapiens* are all interpreted as belonging to the same Basic Type of Homininæ.

As well as morphological considerations (skeletal structure, brain size), the three sub-groups are linked together culturally (ornaments, ritual artwork, the manufacture of tools, care of the sick and burial of the dead) and there is additional evidence of the co-existence of Neanderthals and modern man and a genetic link from the reported Neanderthal/*sapiens* hybrid. Similar conclusions, without the Basic Type framework, have been reached by Lubenow (1992).

From a biblical perspective, if this Basic Type model is correct, the implication is that all members of the Homininæ family are descendants of Adam. Those Christians who accept the dates associated with these fossils find this implication difficult to handle, as they are unwilling to push back Adam to at least 2 million years ago. However, other Christians have challenged these dates, and are seeking a unification of all the data within the framework of history given in the early chapters of Genesis.



The basic type: Homininæ

This article sought to introduce readers to the main issues relating to human origins. As an alternative to the evolutionary framework, a Basic Type approach has been outlined, with the suggestion that it has potential for integrating much data without the need to invoke undiscovered gaps in the fossil record. Whatever understanding of human origins we reach, it must have far-reaching implications on our thinking about life, meaning and man's relationship with God.

Summary

There are numerous indications that scholars and the media are *not* seeking to evaluate alternative interpretative frameworks, but are squeezing all the data into a predetermined evolutionary story. This situation is exacerbated by the relative lack of fossil material. Two 'rules' or 'guidelines' of human anthropology are introduced to assist thinking in this area.

Australopithecines appear to be an extinct family of apes, forming their own Basic Type. Only by selectively emphasising certain features can the term 'ape-man' be made plausible.

Homo habilis is a 'species of convenience'. Evolutionists need a transitional form between the australopithecines and *Homo erectus*, so *Homo habilis* is retained. Where fossil material is more plentiful, habiline material appears ape-like.

Homo erectus, *Homo sapiens* and Neanderthal Man are arguably members of the same Basic Type and within each grouping considerable morphological variation is present.

Studies of fossil man have two dimensions of analysis: the biological and the historical. This article has focused on the biological aspects and has argued that the evidence for an ape-to-man transformation is absent. The historical analysis must address the sequences that have been identified in the fossil record. In particular, an explanation is needed of the apparently sequential appearance of *H. erectus*, archaic *H. sapiens*, *H. Neanderthalis* and *H. sapiens*. How do these data relate to the biblical history of the antediluvians, the Flood catastrophe, the postdiluvians, Babel and the recolonisation of the world? There are dangers here associated with limited data and with shoe-horning data to fit preconceived solutions. However, the christian scholar approaches these issues in the conviction that there is a harmony between God's revelation of human history and the scientific data. That is the foundation on which genuine progress can be achieved.

ACKNOWLEDGMENT

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The Origin of the Cosmos

Paul Garner

THE BIBLE, straightforwardly understood, says that the heavens and the earth were supernaturally created in six days a few thousand years ago. The sun, moon, and stars were made on the fourth day of Creation Week. By contrast, the Big Bang theory says that the universe began with the inflationary expansion of a concentrated ball of mass-energy and space-time about 15 billion years ago.[1] Neither concept is strictly scientific in that they deal with unrepeatable events that took place in the unobservable past. However, we can examine the scientific data available to us today to see which is more reasonable.

Perhaps the most impressive support for the Big Bang theory comes from the discovery in 1965 of the cosmic microwave background radiation (CMBR). Most cosmologists now believe that this radiation is the 'dying ember' from the Big Bang—light waves from the fireball stretched to long wavelengths and low intensities as the universe expanded. However, a major problem with this interpretation is the smoothness of the CMBR. The Big Bang theory says that 'lumps' in the primordial fireball grew into stars, galaxies, and clusters of galaxies. These 'lumps' should be evident today as hot and cold spots in the CMBR. In other words, as we point our detectors into space we should find slight differences in the temperature of the CMBR across the sky. The Cosmic Background Explorer (COBE) satellite was launched several years ago to search for these variations. For the first two years of observations, the COBE satellite revealed that the CMBR was completely smooth. Then, in April 1992, the popular press heralded the discovery of the elusive temperature variations.

Despite the media accounts, however, it is not clear that the problem is solved. The alleged temperature variations are well below the sensitivity of the detector. One COBE team member stated, 'You can't point to any one point in the data and say that's signal and that's noise' (Silk, 1992). The variations were only revealed by a complicated statistical analysis of the data. Furthermore, even if the variations are real they appear to be too small by an order of magnitude to account for the large-scale structure of the universe (Faulkner, 1998). Big Bang proponents are refining their model in an attempt to accommodate this. Besides, another possible cause for the temperature variations has been proposed. As radiation passes through clouds of intergalactic gas, some of the radiation gets scattered and ends up with a different wavelength. This scattering is sufficient to account for the variations detected by COBE (Humphreys, 1992).

Design in the cosmos

There are many features of the universe that make it especially suited for life. If certain constants, such as the strength of gravity and the mass of a proton, were different, then life as we know it would be impossible (DeYoung, 1988, pp.123–126). The earth itself appears uniquely equipped to support life. If its size, composition, distance from the sun, or tilt of its axis were different, then things would be uncomfortable at best; at worst, the earth would become uninhabitable (Bergman, 1996). This has been called the anthropic principle and is a good argument that the universe was designed.

The age of the cosmos

One of the most obvious points of disagreement between the biblical account and the Big Bang is the time scale. Is the cosmos billions of years old or only a few thousand? All estimates of the age of astronomical objects depend on assumptions that may or may not be correct. Nevertheless, there are several lines of evidence that point to ages much less than those required by the Big Bang theory.

Winding up of spiral galaxies

The stars in a spiral galaxy rotate about the galactic centre at different speeds, the inner ones rotating faster than the outer ones. The observed rotation speeds are such that if these galaxies were more than a few hundred million years old, they would have lost their spiral structure and become featureless discs (Humphreys, 1995). A complex

theory of 'spiral density waves' has been used to explain how spiral structure can be maintained for billions of years. However, there are theoretical problems with this idea and it was recently called into question by the Hubble Space Telescope's discovery of very detailed spiral structure in the central hub of the Whirlpool Galaxy (M51).

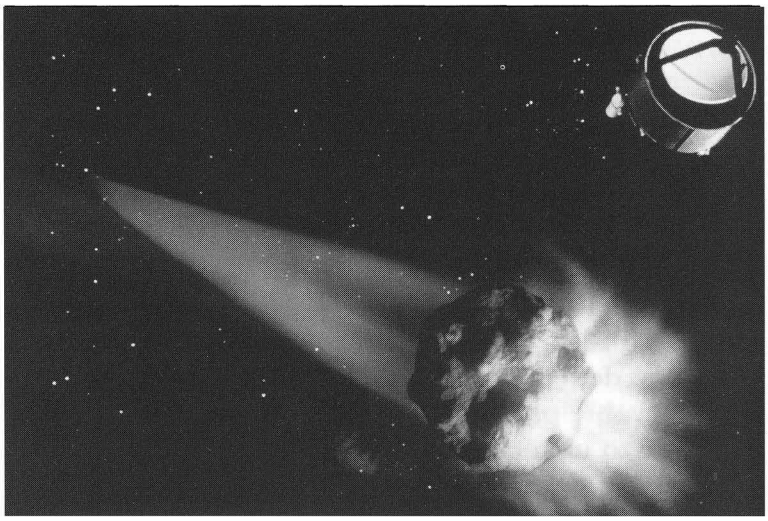
Missing supernova remnants

Occasionally, stars explode violently and leave behind an expanding shell of debris called a supernova remnant (SNR). On average, a galaxy like our own should produce one supernova every 25 years. By applying physical laws, astronomers have worked out what happens to the cloud of debris following the explosion. After 120,000 years, the SNR should reach a diameter of about 350 light-years.[2] If our galaxy is billions of years old, we should be able to see about 5,000 SNRs this size and larger. However, none has been observed (Davies, 1994). This is consistent with the view that our galaxy is no more than 7,000 years old. Astronomers have called this 'the mystery of the missing remnants'.

The lifetime of short-period comets

Comets are mostly made up of ice and have been described as 'dirty snowballs'. According to conventional theory they are the same age as the solar system, about 4·6 billion years old. However, each time a short-period comet orbits close to the sun, it loses so much of its material that it could not survive much longer than about 100,000 years. Some short-period comets have even shorter estimated life spans of about 10,000 years. Usually, astronomers explain this discrepancy by assuming that the solar system is replenished from a cloud of comets called the Oort Cloud, well beyond the orbit of the outermost planet, Pluto. However, there is no evidence that the Oort Cloud exists:

> 'Many scientific papers are written each year about the Oort Cloud, its properties, its origin, its evolution. Yet there is not yet a shred of direct observational evidence for its existence' (Sagan and Druyan, 1985, p.201).

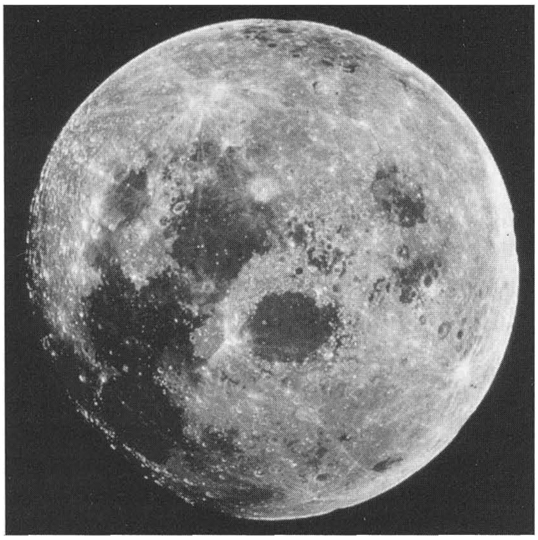


Furthermore, the gravitational interactions that would knock objects from the Oort Cloud into the solar system are highly improbable (Humphreys, 1995). In fact, since 1980 simulations have indicated that the Oort Cloud would be incapable of producing short-period comets in the number observed. This has led to speculation that there is another source of comets, just beyond Pluto, called the Kuiper Belt. Recent searches have revealed some objects in the outer solar system that are claimed to be Kuiper Belt candidates. The orbits and inferred compositions of these objects are consistent with their identification as comet nuclei; however, their large sizes pose a problem for this view. Creationists need to follow these discoveries carefully. Nevertheless, we are justified in concluding that the simplest explanation as to why we can still see short-period comets is that the solar system is young (Faulkner, 1997).

Lunar recession

There have been many different ideas about how and when our moon was formed (Whitcomb and DeYoung, 1978; Sarfati, 1998). The current favourite is the impact theory, in which it is speculated that the moon formed from material that was blasted off the earth by the impact of another huge object. Calculations show that to get enough material to form the moon, the impacting object would need to have been twice as massive as Mars. There are doubts about whether this theory can successfully explain the chemistry of the moon, and there is also the unsolved problem of how the excess angular momentum was lost (Jayawardhana, 1998). The problems with the naturalistic theories proposed thus far are so serious that one astronomer, Irwin Shapiro, half-joked that the best explanation is that the moon does not really exist (Lissauer, 1997)!

There is evidence that the moon is younger than the naturalistic theories allow.[3] Take for instance, the fact that the moon is receding from the earth at about 4 cm per year,



and that the rate would have been even greater in the past. The moon could never have been closer to the earth than 18,400 km (11,500 miles), known as the Roche Limit. This is because the earth's tidal forces would have caused the moon to break up. Even if the moon had originally been touching the earth, it would only have taken 1·37 billion years to reach its present distance (DeYoung, 1990). This places an upper limit on the age of the moon much less than the conventional age of 4·6 billion years.

The magnetic field of Uranus

In 1984, a creationist theory was published that predicted the strength of planetary magnetic fields throughout the solar system (Humphreys, 1984). The predictions were made on the assumption that the solar system is 6,000 years old. For those planetary bodies for which magnetic data were available, the predicted values agreed well with the measured values. However, in 1984 there were no measured magnetic data for Uranus. The real test of the creationist theory therefore came in 1986 when the Voyager II space probe reached Uranus and recorded its magnetic field. Scientists who believed that Uranus was 4·6 billion years old had predicted that it would have a very small magnetic field, or none at all (Dessler, 1986). By contrast, Humphreys' creationist theory predicted that a 6,000 year old Uranus would have a magnetic field strength between 2 x 10^{24} ampere-meters2 to 6 x 10^{24} ampere-meters^2. The actual measured value was 3 x 10^{24} ampere-meters^2, well within the bounds of the prediction. This supports the view that Uranus is no more than a few thousand years old.

Challenges for the young universe model

The arguments that we have looked at show that there is scientific support for the biblical idea of a young created universe. However, creationist astronomy and cosmology are in an early stage of development and there are still many unanswered questions. A major challenge for the young universe model is to explain how light from distant stars has reached the earth in only a few thousand years. Progress towards answering this question was made in 1994 when a new relativistic creationist cosmology was proposed (Humphreys, 1994). However, debate about this cosmology continues and the issue is not yet completely resolved (Conner and Page, 1998; Humphreys, 1998). Another possible solution to this dilemma is that the speed of light was much higher in the past and that it subsequently decayed to its present value (Norman and Setterfield, 1987). This has understandably proved a controversial proposition and continues to be debated in the literature (Bowden, 1998).

Most creationist work has focussed on the solar system or the universe as a whole. Very little has been published on astronomy at the 'medium scale'. This includes the field of stellar astronomy, the origin and development of stars. Some creationists have rejected the concept of 'stellar evolution' (Mulfinger, 1970), while others suggest that it is qualitatively different from biological evolution and has a strong basis in physics (Faulkner and DeYoung, 1991). Encouraging progress has been made but it is clear that there is still a great deal to do before creationist astronomy can be said to have reached maturity as a scientific discipline.

Footnotes

1. The Big Bang is commonly, but erroneously, referred to as an 'explosion'. However, the word 'explosion' suggests expansion into space. By contrast, space and time are themselves considered to have been generated during the Big Bang.
2. A light-year is a measure of distance, not time. It is the distance light travels in one year—about 5.87 x 10^{12} miles.
3. A popular creationist argument for a young moon is the amount of dust on the lunar surface. A re-evaluation of the dust influx data by Snelling and Rush (1993) suggested that newer measurements were consistent with an old moon and that creationists should refrain from using this argument in favour of a young age. Since the review by Snelling and Rush appeared, a new, more direct, and higher measurement of meteoroid influx has been published (Love and Brownlee, 1993). It is recommended that creationists carefully monitor future estimates.

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Catastrophism in Earth History

Paul Garner

THE IDEA that the Earth is billions of years old and that its geological development has been extremely slow and gradual is entrenched in popular opinion. This impression is given to the public by elementary level textbooks, newspapers, television, and museum exhibits. However, this idea is misleading. There is overwhelming evidence that the history of our planet has been dominated by rapid and catastrophic events. In this article I will review just a small proportion of the geological evidence for catastrophism.

Constraining the time scales for deposition and erosion

Moving water carries particles of mud, sand, and silt in suspension. As the water slows, these particles fall to the sea floor or river bed and are deposited as layers of sediment. These sediment layers may be turned into sedimentary rocks as they become compacted and cemented. By examining these rocks, geologists can find clues that tell them how quickly these layers were laid down.

Turbidites

On 18 November 1929 the Grand Banks earthquake struck the coast of New England and the Maritime Provinces of Canada. The earthquake caused a large mass of sediment to move down the continental slope into deep water in the Atlantic Ocean. As the slurry travelled along it snapped 13 transatlantic cables on the sea floor. From the times at which these cables were snapped scientists worked out that the flow was moving at up to 80 km/h (50 miles/h) and travelled over 800 km (500 miles) in a little over 13 hours. The layer of sediment that was deposited by this flow covered more than 260,000 km^2 (100,000 miles^2) and was 0·6–0·9 m (2–3 feet) thick. Geologists call flows like this turbidity currents, and the resultant sediments are called turbidites (Roth, 1975). Thousands of layers, previously thought to have been laid down slowly in shallow water, are now recognized as turbidites laid down rapidly in deep water.

Conglomerates and breccias

Conglomerates and breccias are rocks made up of pebbles and boulders that have been cemented together. The size of the pebbles and boulders tells us that powerful water currents were needed to form these layers. Some contain boulders so large that they have been called megabreccias (Chadwick, 1978). Geologists think that many conglomerates and breccias were laid down during hurricanes, typhoons, or storms. A conglomerate on the Welsh coast, once thought to have taken five million years to be laid down, has been reinterpreted as a storm deposit laid down in only minutes or hours (Ager, 1986).

Cross-bedded sandstones

Within beds of sandstone it is common to find inclined layering called cross-bedding. Cross-bedding is formed as sand dunes migrate across the sea floor under the influence of powerful water currents. Single cross-beds form today in the Mississippi River in less than one minute (Nevins, 1971). Cross-bedding is often therefore a sign of rapid deposition. Some cross-bedding is so enormous that it staggers the imagination. The Coconino Sandstone of the Colorado Plateau, for instance, averages about 96 m (315 feet) in thickness and covers an area of around 518,000 km^2 (200,000 miles^2). It contains cross-beds up to 9 m (30 feet) thick, which would have required a water depth of about 90 m (300 feet). The current velocity needed to form these sand dunes would have been between one and one-and-a-half metres (three and five feet) per second (Austin, 1994). Fast-flowing water 90 m (300 feet) deep over an area almost twice the size of the US state of Colorado is a catastrophe by almost any standard![1]

Fossils

Fossils are the remains or traces of animals and plants preserved in sedimentary rocks. Rapid burial is usually needed to preserve a creature as a fossil. Take fish, for instance. Experiments show that fish decay and become dismembered by currents and scavengers in a matter of days or weeks, even in oxygen-poor conditions. Yet the geological record contains many layers that preserve millions of well-preserved fossil fish. A famous example is the Old Red Sandstone of Scotland. Trewin (1985) draws attention to a specimen from Caithness which shows a large fish *(Glyptolepis)* fossilized in the middle of a meal! The tail of a smaller fish can be seen clearly, protruding from the mouth of the larger fish. In fact, many similar specimens are known from several localities around the world (Vetter, 1990). In some cases, fish have been buried and fossilized so rapidly that even the delicate soft tissues have been preserved. The Santana Formation of Brazil contains fish whose gills and muscles are so perfectly preserved that geologists believe they were fossilized within five hours of death! The foremost expert on these Brazilian fossils, Dr. David Martill (1989), has called this 'the Medusa effect', after the creature of Greek mythology who could turn people to stone instantly with her stare.

Fish are not alone in their striking testimony to rapid burial and fossilization. Extinct marine reptiles such as ichthyosaurs, which tend to be preserved in muddy sediments, have been found with even their skin preserved as a black carbon film around the skeleton. A great deal of mud is needed to bury a creature as large as an ichthyosaur. How rapidly was this mud deposited? An ichthyosaur found at Holzmaden in Germany was fossilized while giving birth! Three baby ichthyosaurs can be seen within the rib-cage of the mother, and a fourth had just been born (see cover photograph in Carroll, 1988).

Another extraordinary find was of two duelling dinosaurs—a *Velociraptor* and a *Protoceratops*—discovered during an expedition to Mongolia in 1971. The positions in which the animals were excavated indicates that the *Velociraptor* had jumped onto the *Protoceratops* and was in the middle of attacking it when both animals were buried and fossilized (Calais, 1989; Halstead, 1975, p.80).

More evidence of rapid burial comes from the study of fossil trilobites—an extinct group of marine arthropods. They look superficially like woodlice, and some species were able to roll up in a similar way for protection (Nield and Tucker, 1985, p.17). Many trilobites are found fossilized in this position; I have some in my own collection. This tells us that these animals were buried alive while trying to protect themselves.

Fossil crinoids (sea-lilies) also give us excellent evidence for rapid burial. Crinoids are made up of small calcium carbonate plates, called ossicles, that are held together by soft tissues. When the creature dies, the soft tissues quickly decay and the ossicles begin to break apart. Experiments and observations of modern crinoids show that dead sea-lilies completely break up in a matter of days, even in still water (Liddell, 1975; Meyer, 1971). Well-preserved and intact crinoids, such as those found in the Jurassic rocks of Dorset, must therefore be specimens that were buried in sediment while the creatures were still alive or very soon after death.

Were there long time gaps between layers?

Many professional geologists have come to recognize the impressive evidence for catastrophism in the geological record, although most of them still believe that the earth is over four-and-a-half billion years old because of radiometric dating methods. But this leaves them with a big problem. If the rocks were often laid down rapidly, then where are the missing millions of years?

The answer, according to these geologists, is that the missing time is represented by gaps in the geological record when no sediments were being laid down or when erosion removed sediments that had previously been laid down. These geologists place great emphasis on the role of erosive events in forming the geological record. The late Dr. Derek Ager, a former President of the Geologists' Association, put it like this:

> '... the history of any one part of the earth, like the life of a soldier, consists of long periods of boredom and short periods of terror' (Ager, 1981, pp.106–107).

If the idea that the earth is billions of years old is to have any credibility, then the missing millions of years must be in the gaps. But does this idea stand up to scientific examination?

There are places where there is evidence for the passage of time between layers. For instance, there are documented cases of colonized sea-floors (hardgrounds) throughout the geological record (Wilson and Palmer, 1992). They are quite common in Ordovician, Jurassic, and Cretaceous rocks. Hardgrounds are places where sedimentation ceased, the sea-floor became hardened, and burrowing and boring creatures like clams, worms, or shrimps colonized the hardened surface. Obviously, hardgrounds like these require time to develop. What are creationists to make of them? Do they invalidate the idea of a young earth? Creationists need to investigate the problem of hardgrounds much more thoroughly than they have done to date. However, suffice it to say that the time represented by these hardgrounds is relatively short—only months, years, or decades—not thousands or millions of years! The time required for the formation of hardground surfaces is compatible with a young earth.

Powerful evidence against long time gaps (thousands or millions of years) in the geological record is provided by what geologists call paraconformities. Paraconformities are places where huge amounts of time are thought to have passed, yet there is very little physical evidence to show it. Remember that the top of each layer must once have formed the sea floor (or land surface) before it was covered up by the next layer. We know that if a layer forms the sea bed or land surface for a substantial period of time it is very vulnerable to damage. For instance, it will be exposed to erosion. The very next tide or rainstorm will begin to scour the sediment away. More importantly, the seas teem with living creatures that burrow into the sediment, excavating it, to build dwelling places or to feed. This process is called bioturbation. Bioturbation is an extremely effective way of destroying layering in sedimentary rocks, by mixing up the sediment and homogenising it. It is easy to find modern-day examples of this. Hurricane Carla laid down a distinctive layer of sediment off the coast of central Texas in 1961. About twenty years later, geologists returned to this layer to find out what had happened to it. Most of the layer had been destroyed by living creatures burrowing into it and disturbing it, and where the layer could still be found it was almost unrecognizable (Morris, 1994). It is difficult to imagine a layer of sediment surviving intact for more than a few centuries at the very outside.

In the geological record there are many instances where the junction between two layers is supposed to represent a gap of millions of years. If this were true then there ought to be ample evidence of erosion and disruption at these junctions. What does a close examination of these gaps and the adjacent layers tell us? Let us consider a few examples of real-life rock sequences.

Figure 1 shows the north face of Pen y fan in the Brecon Beacons, South Wales. Along the line marked X–Y there is a claimed gap of 10 million years (Garton, 1993). Geologists think that the layer below X–Y was a land surface exposed to erosion before it was buried by the sediments above (Dineley, 1992, pp.186, 200; Cocks, 1993). The illustration shows that the junction is flat and smooth. There is little evidence of prolonged exposure as a land surface—note the monotony and the continuity of the layers, all intact.

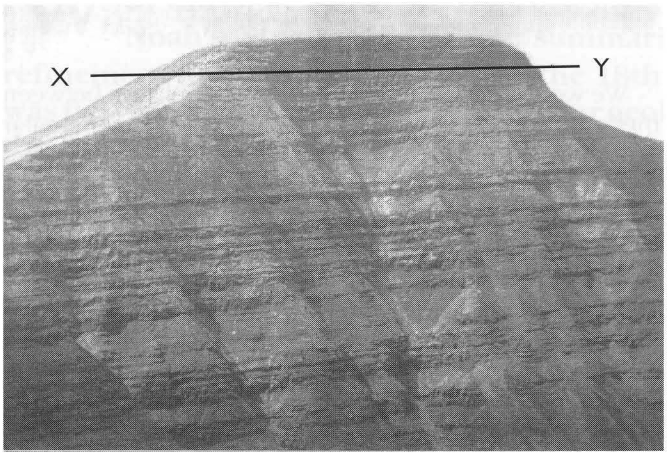

Figure 1. The north face of Pen y Fan, Brecon Beacons, South Wales

From Dead Horse Point in Utah it is possible to observe dramatic canyon erosion by the Colorado River. Exposed there are two major gaps in the geological sequence—one thought to represent 10 million years, and the other 20 million years (Roth, 1988). The 10 million year gap has been traced over 250,000 km^2 (100,000 miles^2). Sandwiched between these two gaps are deposits of the Moenkopi Formation, a sequence of continental deposits (important, because on land a layer is more vulnerable to gully and channel erosion). Yet again, there is no evidence of a prolonged period of erosion along the tops of these layers. They are quite flat and featureless.

Many other examples of paraconformities like these have been described (Roth, 1988). One well-known geologist admitted:

> 'The origin of paraconformities is uncertain, and I certainly do not have a simple solution to this problem' (Newell, 1967, p.364).

The obvious answer is that the time spans represented by these gaps in the sedimentary record were very much shorter than most geologists assume.

Summary

Contrary to the popular notion that geological processes are extremely slow and gradual, we have seen that the history of the Earth has been dominated by catastrophism. Furthermore, the idea that millions of years can be accommodated in the gaps between sedimentary layers does not stand up to critical scientific examination. These facts are consistent with the creationist view that our planet has had a short but dynamic history.

Footnote

1. It might be objected that these calculations are invalid since the Coconino Sandstone is usually regarded as an æolian (*i.e.* windblown) deposit. However, there is compelling palæontological and geological evidence against an æolian interpretation and in favour of an underwater origin (Brand, 1979; Brand and Tang, 1991; Visher, 1990, pp.211–213).

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What is man?

THE ANSWER to this may seem obvious, but, according to anthropologist Donald Johannson, 'It may seem ridiculous for science to have been talking about humans and prehumans and protohumans for more than a century without ever nailing down what a human was. Ridiculous or not, that was the situation. We do not have even today, an agreed-on definition of human-kind, a clear set of specifications that will enable any anthropologist in the world to say quickly and with confidence [that] this one is human and that one isn't.'

Bernard Wood and Mark Collard (Science, 1999, 284(2 April):65–71) have suggested some criteria based on body size, body shape, locomotion, jaws and teeth, development and brain size. But what about his uniqueness in intelligence, creativity, communicability and community, spirituality (conscience, choice, compassion), industry and authority?

Sometimes we are reminded that man and the chimpanzees have 98.4% similarity in their genes. The implication is that we have evolved one from the other. It is an evolutionary assumption that we are nothing but genes. Fish have a 40% similarity in their genes to us—so are they 40% human?

We would expect a high degree of correlation between the chimpanzee and man because we have similar physiologies. But, even in this small difference there are some big evolutionary hurdles. There are at least 100,000 genes in the human. Probably, on average, each gene has over 1,000 nucleotides. If we have a difference of 1·6% between man and the chimpanzee, we have between one and ten million nucleotide differences. If these are the result of mutations and we allow that 1 in 1,000 mutations are beneficial, we would need a thousand million or more mutations to produce these changes. The evolutionist estimates that it takes a thousand years for a mutation to take over the population. So it would take longer for their mutual ancestor to change into a man rather than a chimpanzee than the age of the earth!

The apes are marvellous creatures, but they are not our ancestors or cousins. Man is very different. Indeed, the Psalmist tells us that man must be special because of God's special care for him and because of the authority God has given him in this world (Psalm 8). In particular, he says, we are special because God has made us a little lower than the heavenly beings and has visited us.

J.H.J.P.

Does it matter?

WE ARE often asked if it really matters what we believe about origins. Here are the comments of some evolutionists:

'Like [the] discarded creeds before it, neo-Darwinism is mounting a full-scale assault on freedom of the will, on immortality, on moral grandeur, on the human soul itself.' [Garth Wood, *The Final Blow to God.* The Spectator, 20 February 1999, p.12.]

'There are two other doctrines prevalent today which deny evil and thereby prevent our developing the correct response to it. Psychoanalysis has no use for the concept of evil, nor does neo-Darwinism.' [Garth Wood, *Beware of Evil Counsellors.* The Spectator, 8 May 1999, p.13.]

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Patterns in the Rock Record:

Flood Geology and the Geological Column

David J. Tyler

WE HAVE records going back to at least the 2nd century AD of Christians interpreting rock layers as evidence from Noah's Flood. This article summarises how, with the refinement of scientific methods in the 18th century, the Flood was first acclaimed to have been the major geological influence on the Earth, but later was relegated to the uppermost part of the geological strata.

However, even before the middle of the last century (before Darwin's ideas on evolution) the Flood was said to have had no global geological significance. Modern day creationists attempt to reaffirm the intentions of those in the 18th century—the Flood is essential to the understanding of geology. But there are some serious differences of opinion amongst creationists about the way basic geologic evidence should be interpreted: in particular, was the acceptance of the geological column in the 19th century a scientific blunder or a real (if idealised) summary of the rock record? Members of *BCS* have argued that the column is a helpful summary, but the millions of years attached to it are unwarranted.

The pioneering scholars of geology in the 17th century developed their thinking in the context of the Creation, the Flood and the New Creation (as you might expect of people influenced by biblical literature). The Flood was perceived to have eroded the antediluvian world and have left sediments, which are still to be seen covering the Earth. Some pointed to fossils in mountains as confirmation of this reconstruction of the past.

As time went on, it became less fashionable to link earth science with the biblical text and this trend was accompanied by a proliferation of speculative thinking. People explored geological models involving cometary impacts, earthquakes, stratification governed by the specific gravity of materials, chemical precipitation, earth cooling, and so on. The problem was that whilst these ideas appeared to work with specific data, they did not work outside those selected data. The quest continued for a coherent interpretative approach to the earth's geological history.

A major change in thinking came with James Hutton in the late 18th century, who based his geological ideas on two philosophical positions: empiricism and Deism. Empiricism meant that the processes of interest must be exclusively accessible to our senses and consequently amenable to scientific enquiry (this was a conscious move away from speculative models and from any lingering tendency to work with biblical revelation) and Deism meant that these same processes were ordained of God to maintain the Earth as a fit home for mankind, animals and plants. Hutton developed the concept of a rock cycle, which he regarded

Eon	Era	Period	Epoch
Phanerozoic	Cenozoic	Quaternary	Holocene
			Pleistocene
		Tertiary	Pliocene
			Miocene
			Oligocene
			Eocene
			Palæocene
	Mesozoic	Cretaceous	
		Jurassic	
		Triassic	
	Palæozoic	Permian	
		Carboniferous	
		Devonian	
		Silurian	
		Ordovician	
		Cambrian	
Proerozoic			
Archæan			
Pre-Arcæan			

Figure 1. The Geological Column (simplified)

as God's way of renewing the surface of the Earth in a continuous series of cycles. Deism led Hutton to make some appeal to God's government of the world, and he did have a place for Creation in the remote past, but most significantly Hutton had no concept of the Flood.

Geologists in the early part of the 19th century became less interested in 'global models' and instead were absorbed in clarifying their understanding of the stratified rocks. They realised that the geological strata exhibited patterns. The lower rocks were often altered and hard, with marine fossils and extinct life forms. The upper rocks were much softer and had fossils of land animals and plants as well as marine animals (often more closely identifiable with living forms). Distinctive sequences of fossils were found, enabling rocks separated by large distances to be correlated.

Many of this generation of geologists had a Christian background and wanted to retain a belief in the Flood. They identified the Flood with the uppermost layers of the widespread sequence of rocks, which came to be known as the geological column. They called this horizon the Diluvium (named after the Deluge). It comprised sands, clays and pebble-beds, often with the remains of mammal bones and a great variety of other animals and plants. A few protests were made, by a group of writers known as the 'Scriptural geologists', that the Flood ought to have left a more significant record, but they were either ignored or unfairly treated as incompetent.

This situation continued for another generation, until in the 1840s Louis Agassiz reinterpreted the Diluvium as the deposits left by glacial activity. Then, the local flood theory became popular in Christian circles.

The trend in interpretation was to push the strata associated with the Deluge 'up' the geological column until it disappeared from sight as a global phenomenon. This may be understood by reference to Figure 1.

By the end of the 19th century, most Bible-believing Christians adapted their thinking to the local flood concept and generally adopted biblical interpretations that meant that they did not have to engage in a debate about how the rocks should be understood. This situation continued until the 1920s, when George McCready Price, a member of the Seventh Day Adventists, picked up the issue. Price threw himself into the work of challenging many of the accepted 'truths' of earth science. He argued that the sequence of fossils that was incorporated into the geological column was illusory; he suggested that the glacial deposits were actually late-stage Flood deposits; he disputed the concept of overthrusting. He set out to revive the idea that the fossiliferous rock record testified to the Flood and, despite many rebuffs, he did convince some people that he was on the right lines.

Price's wholesale rejection of the geological column did not satisfy Harold Clark (1944). Clark had once been a student of Price and promulgated his views until field experience persuaded him otherwise. He chose to defend the geological column and justified the practice of correlating strata within and between continents utilising fossils. He explained the order of fossils in terms of ecological zonation (that is, the rising floodwaters overwhelmed different ecosystems at different times during the Flood year). Clark did not reject the glacial interpretation, although he was willing to reinterpret some of the 'glacial' features as deposits of retreating floodwaters.

These two men failed to reach agreement over these important issues, and such differences of view have continued to affect the advocates of diluvialism ever since.

1961 saw the publication of John Whitcomb and Henry Morris's book *The Genesis Flood*, which is widely perceived to be a landmark in the history of diluvialism. As far as Flood models are concerned, they took a position similar to Price on the geological column, concluding that it is artificial and misleading. However, they recognised that as far as any local area was concerned, patterns in the fossils were present and needed explaining. They utilised Clark's eco-zone approach (plus two other concepts known as differential mobility and hydrological sorting) to explain these patterns. Whitcomb and Morris also followed Clark, rather than Price, in advocating a post-Flood glacial phase.

Although diluvialism received a tremendous impetus from the publication of *The Genesis Flood*, the basic differences between Price and Clark concerning the geological column were not satisfactorily resolved. Some diluvialists have continued the attack on the geological column concept by alleging illogical reasoning, unwarranted correlations and contrived explanations of how 'old' rocks are found over 'young' rocks. Other diluvialists agree with the conclusion from the middle of last century: the geological column amounts to a valid summary of field evidences. They seek to explain real patterns revealed in the rock record.

As an example of what this means, take the deposits that contain dinosaur bones and those that contain mammal bones. Those who reject the geological column suggest that the dinosaurs perished in one locality at a similar time as mammals perished in another locality. The mistake, in their view, is to correlate the local stratigraphical columns to infer that the fossils were formed at different times in unrelated incidents. By contrast, those who accept the geological column say that there was a global abundance of dinosaurs at one time on the Earth, with mammals being globally abundant at a later time. In other words, these diluvialists accept and seek to explain the sequential order of historical geology, essentially worked out before 1850. However, they reject the millions of years that have been attached to this order.

Most of the popular literature advocating diluvialism has followed the lead of Whitcomb and Morris. Consequently, it can be confusing to people new to the issues to find some diluvialists advocating concepts, which are rejected, as 'evolutionary' in much popular creationist literature. It is particularly for people who may be struggling with this tension (or who want to know what the debate is about) that this article is written.

The *Biblical Creation Society* has published several contributions to this debate, all of which endorse the general concept of the geological column. Articles that specifically interact with this issue are those by Watts (1985), Garton (1990b) and Robinson (1997). In addition, several *BCS* diluvialists participated in a small international gathering that set out to clarify the debate. A statement on the geological column was prepared and subsequently published (Snelling *et al.*, 1997) in *Origins* and elsewhere.

As far as interpreting these fossil and rock sequences are concerned, a series of articles in *Origins* was written by Michael Garton (1990a, 1990b, 1991a, 1991b, 1993, and 1997). These take the geological column as a historical record, and show what can be learned from it. Earlier *BCS* contributions which sought to develop thinking along these lines were by Scheven (1984, 1990, 1993). Careful readers will note that these articles are not completely consistent, particularly in relation to the place of Precambrian rocks (that is, Proterozoic, Archæan and Pre-Archæan) to the Flood catastrophe. It is fair to say that there has been an emerging understanding of the issues during the past 15 years and this process is ongoing. The more recent thinking is to associate the Precambrian and Palæozoic rocks with the Flood year, and the Mesozoic and Cenozoic rocks with post-Flood catastrophism contemporary with the recolonisation of the earth by air-breathing and marine animals.

This article could be greatly extended by referring to other papers and authors and to the wider debate within diluvialist circles. However, this would go beyond the brief of this article. It is not possible here to explore technical issues, although this is what must be done by participants in the debate. The urgent need is for systematic and detailed field studies supported by careful theoretical and biblical thinking.

However, it is interesting to note the pattern that is emerging in the way Flood models have been developing in recent years. Whitcomb and Morris interpreted all of the Palæozoic–Tertiary strata as Flood rocks, but subsequently the horizons representing the onset of the Flood and the end of the Flood have been moved lower in the Column by some Flood geologists. A major issue for contemporary debate is where in the geological column these horizons should be placed. A good case can be made for the post-Flood boundary to go even further down—but this is where this article must stop!

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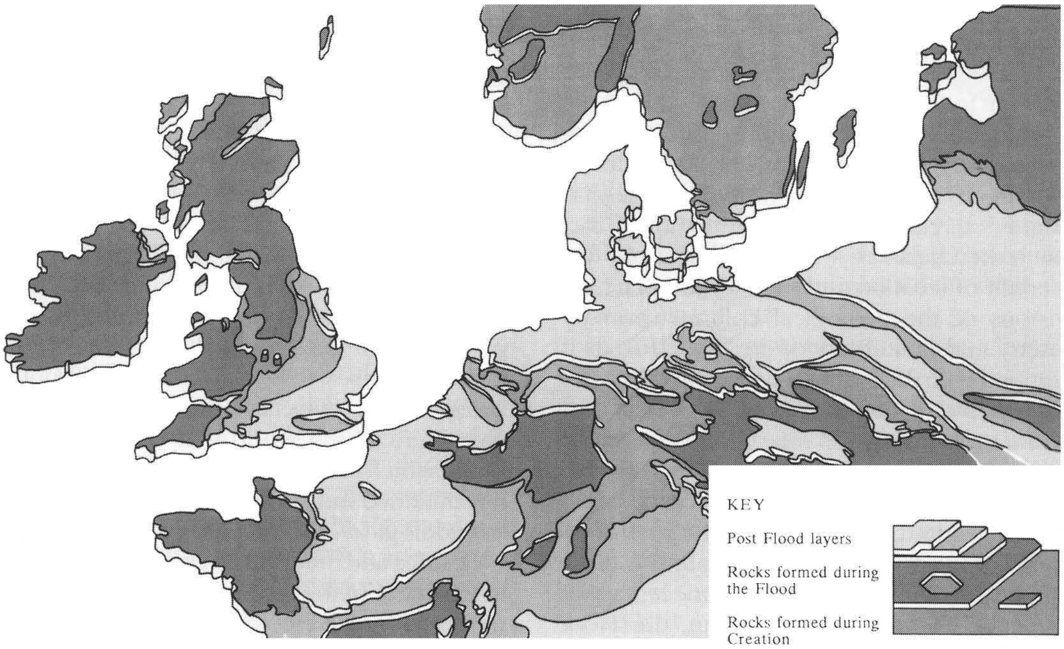


The Rock Layers which make up N.W. Europe (after Michael Garton, in Origins Vol. 3 No. 9)

Dating Methods

Andrew A. Snelling

IN MOST people's minds today the age of the Earth's rocks and of the Earth itself have been established by geologists using radioactive dating techniques. However, well before these radioactive dating techniques were fully developed in the 1950s onwards for widespread use by geologists, the Earth's rocks were already being assigned ages of millions of years by other methods.

Non-Radiometric Methods

Historically, the process of developing multi-million year ages for the Earth's rocks began as a consequence of applying the theories of uniformitarianism and then evolution to the sequences of rock units that were being mapped across Britain and Europe. As geologists, such as English canal-builder William Smith, began mapping the strata in England during the 1790s it was obvious that there was an ordered sequence which therefore represented a relative chronology for the Earth's history (Berry, 1968). It was found that some strata could be correlated across Britain and Europe, not only because of similarities in rock type, but because of similar to identical fossil assemblages and the same relative places in the overall strata sequence. So it was that between them these early geologists established that there was a sequence of rock strata that was similar throughout Britain and Europe, though with local variations, additions and absences, which essentially corresponds to what today is known as the geological column. It needs to be emphasised that many of these early geologists responsible for compiling this geological column were believers in Noah's Flood, and they only assigned a relative chronology to these rock sequences which they believed was still compatible with the biblical account of creation and the Flood. In fact, the major subdivisions of the geological column (primary, secondary, tertiary and quaternary) were named so as to be directly identified with the biblical chronology Creation, Flood, residual Flood and post-Flood respectively.

The theory of uniformitarianism rose to predominate in the thinking of most geologists during the 1830s as a result of the prolific advocacy of Charles Lyell. Because of the emphasis on interpreting the formation of the rock strata only in terms of geological processes operating today it was argued that vast eons of time were necessary to deposit the strata of the geological column, the Flood eventually being assigned to irrelevancy and myth (Lyell, 1830–1833). Next came the rise of the evolutionary theory in the 1860s, which attempted to explain the fossil assemblages of the geological column as a succession of life through those vast eons of time.

Thus dating the rocks by the fossils contained in them became a firmly entrenched method more than a century ago. By the 1830s the basic sequence of strata had been worked out, named and grouped into the eras and periods of the geological column. Lyell was arguing strongly that in order to explain and understand how the different strata were formed, all one had to do was to look at where and how layers of sediment are deposited today. Thus it was immediately recognised that the rates of sedimentation today are very slow and gradual. Then today's rates were extrapolated to produce estimates of the time-spans involved in the deposition of the layers of sediment in the geological column which hardened to rock subsequent to their deposition and burial by overlying layers. This reconstruction of Earth history dovetailed perfectly with the idea that ecosystems of animals and/or plants lived, died and were then buried in the slowly accumulating sediments progressively recording the evolutionary development of life. Thus once these faunal and floral assemblages were documented and allocated to their stages in the evolutionary history of life, they were used when found in rock strata in newly mapped areas to assign those rock strata to the appropriate places in the geological column. Certain fossils became known as index fossils, which when found in a rock unit automatically correlated that rock unit with rock units elsewhere in the world that contained that same index fossil, which in turn automatically placed that rock unit and its contained index fossil to the same geological period in the geological column. Age estimates were placed on the rock strata and their contained fossil assemblages according to estimates of the time required for deposition of the rock units and for the life-spans and evolutionary development of the animals and plants represented in the fossil record.

In the years following the establishment of the geological column and the associated geological timescale, other scientists attempted to use other physical processes apart from the deposition of sediments as a means of estimating the age of the Earth and therefore its rock strata. In 1715 Edmund Halley had recognised that the age of the ocean might be established from knowledge of how much salt enters it year by year from rivers. This suggestion was taken up by John Joly in 1899, who measured the amount of sodium dissolved in river water and estimated with very good accuracy the global yearly sodium input to the ocean (Joly, 1899). He thus concluded it would take 80–90 million years for the ocean to accumulate its present amount of sodium, provided it contained none in the beginning and it accumulated at a constant rate. At the time this estimate was also accepted by many scientists as giving the age of the Earth.

Another method of obtaining a more direct estimate of the age of the Earth was made by Lord Kelvin in 1899 also. His estimate was obtained by computing the time for the Earth to cool by conduction from a supposedly molten state to its present condition of low surface heat flow (Kelvin, 1899). Kelvin originally believed that the only major question in this method was the value of the initial temperature, the 'initial event' being dated, which he regarded as the date of creation. His age estimates ranged from the 20 million year figure which he preferred, to at most a few hundred million years.

However, these estimates for the age of the Earth made by Joly and Kelvin were in disagreement with other estimates of the duration of terrestrial processes, such as ages based on rates of evolution of various fauna, made by geologists at the time. These discrepancies were 'resolved' in favour of the geologists by the discovery of radioactivity at about the same time, and the subsequent use of radioactivity to 'measure' the age of the Earth and its rocks (York and Farquhar, 1972). It was considered, for example, that the radioactive elements decaying within the Earth acted as sources of heat and thus materially prolonged the cooling process. And, in the case of sodium dissolved in the ocean, because scientists became convinced that the Earth and the ocean were in fact billions of years old, they could no longer accept Joly's estimate. They suggested instead that sodium must be removed from the ocean as fast as it enters, causing the amount of the sodium in the ocean to remain roughly constant with time. Thus these methods for estimating the age of the Earth were rejected because radioactivity in the Earth's rocks was considered a more reliable geochronometer, giving ages for strata more compatible with the geological timescale which had been developed on the basis of uniformitarianism and the theory of organic evolution. (It is worth noting that recent investigations by creationists Steve Austin and Russ Humphreys have shown that the steady state model for sodium in the ocean is firmly contradicted by the data, and that a lower estimate than that of Joly can be accommodated well into the creationist model of earth history (Austin and Humphreys, 1990.)

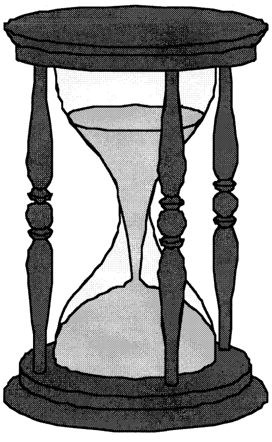
Radiometric Methods

Some isotopes of 'parent' elements such as uranium, thorium, potassium, rubidium and samarium are radioactive because the nuclei of their atoms are unstable, resulting in readjustments with time. To achieve stability alpha particles (consisting of two neutrons and two protons) or beta particles (electrons resulting from disintegration of neutrons) are ejected from the nuclei, resulting in stable atoms of the 'daughter' isotopes of lead, argon, strontium and neodymium respectively.

Assumptions and their validity

The first step in the radiometric dating techniques is to measure the amounts of the parent and daughter isotopes in a rock sample using a mass spectrometer, which is capable of very good precision and accuracy. Thus in general there is no disputing the resulting chemical analyses. However, it is with the next step, the interpretation of the chemical analyses, that the problems with radiometric dating of rocks begin. Three vital assumptions are made:—

- the initial conditions are known;
- the system has been closed; and
- the radioactive decay rate has remained constant.



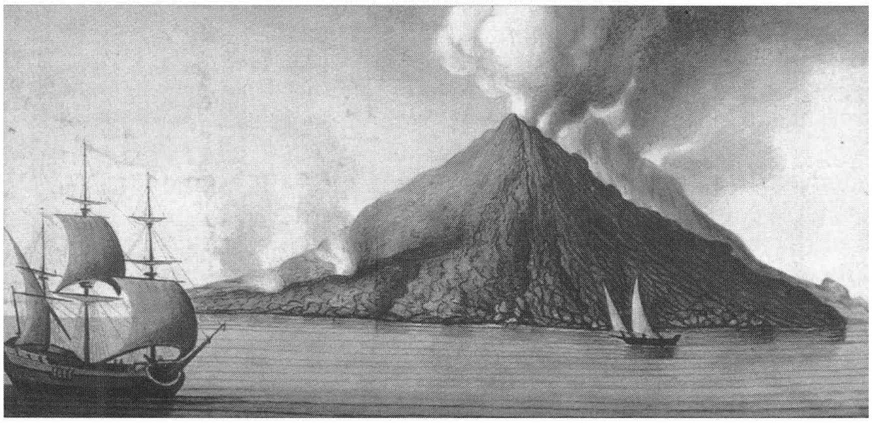
These assumptions are easily understood by analogy with an hourglass, where grains of fine sand fall at a steady rate from the top glass bowl to the bottom. This 'clock' works because the initial conditions are known: all the sand grains are in the top glass bowl. If there is already some sand in the bottom glass bowl, then, unless this amount is known, the hourglass 'clock' cannot 'tell' the time. Similarly, if the system has not remained closed (for example, if sand was somehow added or subtracted), then the calculation of the elapsed time, based on comparing the amounts of sand in the two glass bowls, will again lead to an incorrect conclusion. Finally, if the rate at which the sand grains fall varies (for example, moisture causes some clogging of the sand), then again the hourglass 'clock' will be inaccurate.

In the case of the radioactive 'clocks' these three assumptions can be shown to be not only unprovable, but invalid. For example, no scientist was present at the Earth's origin, so we can never be absolutely sure what were the initial conditions. Thus the amount of daughter isotope which has been derived from the parent isotope by radioactive decay is unknown, since some of the daughter isotope might have been present with its respective parent isotope at the Earth's origin.

Similarly, it cannot be proved that the radioactive systems have been closed through all the supposed millions of years of decay of parent isotopes into daughter isotopes. Again, no scientist was present to observe everywhere these radioactive systems and report that they have been closed through all their history. Indeed, the evidence indicates the very opposite, that these systems have been open to external influences.

For example, uranium is generally mobile in oxidising groundwaters near the Earth's surface. Thus if a rock sample is analysed, it would be incorrect to assume that all the uranium and lead isotopes in the sample were there only because of the amounts in the rock at its origin and of undisturbed radioactive decay from uranium into lead. Some of the uranium might have been leached out of the rock, hence making the sample appear older than it really is according to this radioactive 'clock'. Or, some uranium might have been deposited from groundwaters in the sample, thus making it appear younger.

Geochronologists often plot the chemical analyses as isotope ratios on graphs, and these often show that the parent-daughter systems have not been closed, but open. Furthermore, by interpretation of these graphs they often quantify the loss or gain and thus overcome this difficulty to still 'read' the radioactive 'clock'. However, these interpretations to overcome this problem of the invalidated closed-system assumption cannot be proved, and are merely assumed to be correct because they make the radioactive 'clocks' work.



The final assumption is that the radioactive decay rates have remained constant. Again, this assumption cannot be proved, because there were no human observers present throughout the Earth's history to be constantly measuring the radioactive decay rates and recording them.

It is incorrect for geochronologists to argue that radioactive decay rates have been carefully measured in laboratories for the past 90 or 100 years and that no significant variations have been measured. To the contrary, in the literature up to 1975 there are approximately 50 experiments which report small but significant changes to the radioactive decay of different isotopes produced mainly by changing the chemical environments of the isotopes (Hahn *et al.*, 1976). The largest deviation reported was a little over 20% for the alpha decay of uranium. Thus, if decay rates can be made to vary today, there is no guarantee that they have not varied in the unobserved past. Yet geochronologists are essentially taking 90–100 years of measurements and assuming constant decay rates, extrapolating backwards in time to the origin of the Earth, which they believe to be 4.5 billion years ago. This is a many orders of magnitude extrapolation which would normally be considered unwarranted and unreasonable in other scientific fields, but it is accepted in geochronology because it gives the desired millions and billions of years and makes the radioactive 'clocks' work.

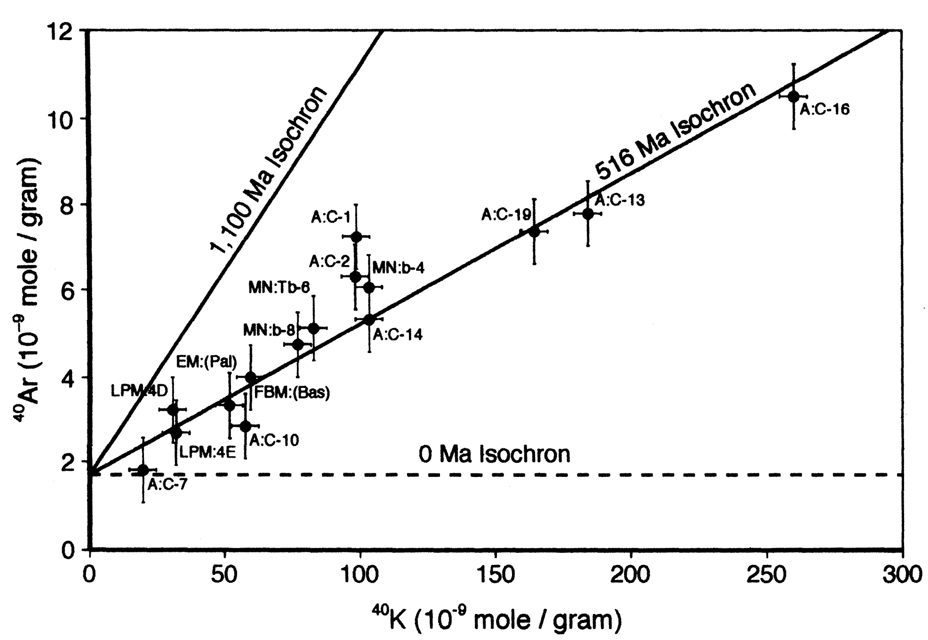
So none of these three basic assumptions which are foundational to all radioactive dating techniques can be proved. Rather, these three assumptions are invalid, not only because the initial conditions, constant decay rates and closed systems of the unobservable past have not been proven, but because we know of observations contrary to these assumptions.

The isochron method

It is because of these problems with single sample radioactive 'age' determinations that geochronologists perform analyses on a group of samples from the rock unit under investigation in what is known as the isochron method. It is reasonable to assume that rock samples carefully collected from a single geological unit formed at the same time and therefore have the same age. However, each rock sample will differ in the amounts of both daughter and parent isotopes it contains, so, when the analytical results are plotted on a graph, they usually form a linear array through which a sloping line can be drawn with a high degree of fit of the data points. This line is interpreted as an effect produced by radioactive decay, and since all samples of the rock unit supposedly formed at the same time this line is called an isochron (from the Greek *isos* equal, and *chronos* time) or line of equal age. The slope of the line is used to calculate the isochron 'age' of the geological unit.

This isochron method has become popular because no knowledge or assumptions about the initial conditions of parent and daughter isotopes need be made. However, the assumptions of constant decay rate and a closed system are again necessary. The method also has two other critical assumptions: the samples must represent the one geological unit that formed at the same time, and the daughter isotope was uniformly distributed throughout all the samples when the rock unit formed.

However, problems have arisen with this isochron method. It has been found that 'a linear relationship between $^{87}Sr/^{86}Sr$ and $^{87}Rb/^{86}Sr$ ratios could sometimes yield an anomalous isochron which had no distinct geological meaning' (Zheng, 1989, p.1). Previously it was creationists Russell Arndts and William Overn who had pointed out this problem, and who had showed how isochrons were often a result of the mixing of radioisotopes from different sources (Arndts and Overn, 1981). Such



Ar–K lines for Cardenas Basalt

processes often only involve the mixing of chemical components via fluxes of fluids, principally water, through rocks, such as hydrothermal alteration, metasomatism and metamorphism.

At the end of his paper, Zheng (1989, p.14) wrote:

> 'In conclusion, some of the basic assumptions of the conventional Rb–Sr isochron method have to be modified and an observed isochron does not certainly define a valid age information for a geological system, even if a goodness of fit of the experimental data points is obtained in plotting ^{87}Sr/^{86}Sr *vs.* ^{87}Rb/^{86}Sr. This problem cannot be overlooked, especially in evaluating the numerical time scale. Similar questions can also arise in applying Sm–Nd and U–Pb isochron methods.'

Examples of problems

A common impression given is that the use of different radioisotopic systems to date the same rock will yield the same 'age'. This is not so. For example, a 1·07 billion year Rb–Sr isochron 'date' for the Cardenas Basalt in the Grand Canyon has been firmly established in the literature, yet a 14-point K–Ar isochron for the same rock yields a strongly discordant 'age' of 516 million years (Austin and Snelling, 1998). Equally disturbing is the fact that the K–Ar model 'ages' of those 14 samples range from 577 to 1013 million years. The explanation for these glaring discrepancies is the migration of excess ^{40}Ar from the mantle source areas of volcanic rocks (Snelling, 1999a). This results in young volcanic rocks yielding anomalous ages for example, the June 30, 1954 andesite flow from Mt. Ngauruhoe, New Zealand, yielded 'ages' up to 3·5 million years (Snelling, 1998). In fact, this excess ^{40}Ar is indistinguishable from radiogenic ^{40}Ar produced from *in situ* radioactive decay of potassium and is now known to also migrate through all crustal rocks, thus casting doubt on the validity of K–Ar and Ar–Ar 'dating' (Snelling, 1999b).

Furthermore, as reported by Zheng (1989) the Rb–Sr system is not immune from this same problem. For example, Brooks *et al.* (1976) reported a study of 22 selected volcanic rocks from around the globe which were all regarded as 70 million years old based on other geological evidence, but which yielded Rb–Sr 'ages' ranging from 70 to 3340 million years. In the Grand Canyon, Austin (1994, pp.123–125) has found that recent lava flows which are the youngest rocks in the Grand Canyon yield a Rb–Sr isochron 'age' of 1340 million years, even though the same flows yield K–Ar model ages as young as 0·01 million years.

Perhaps the most popular and highly regarded method currently is the U–Th–Pb 'dating' of zircons and other appropriate minerals contained in many crustal rocks. It has long been known that lead diffuses from zircon and uranium-bearing minerals at temperatures as low as 50 C (Tilton, 1960). More recently, different 'ages' have been obtained from different faces of the same crystal (Wingate and Compston, 1997). Not only does radiogenic Pb/U vary within grains at the sub-microscopic scale (Compston, 1997), but unsupported (or excess) radiogenic lead can produce anomalously high 'ages' (Williams *et al.*, 1984). Such situations result in ages hundreds of millions of years more than expected and are interpreted as due to excess radiogenic lead, the origin of which is either interpreted as mixing from older source materials and/or due to migration as a result of fluids, temperature and pressure (Copeland *et al.*, 1988; Zhang and Schärer, 1996).

Conclusions

Open-system behaviour is evident in the radioisotopic 'dating' systems in all types of rocks, and initial conditions cannot be verified independently. Some decay rates have been experimentally changed. Internal consistencies do exist, but as with the identification of open-system behaviour, results are accepted because of *a priori* expectations about the correct 'dates' that make the radioactive 'clocks' work. Even when that happens, the plethora of anomalous results, problems and pitfalls warn us that even when 'correct' results are obtained they still may be an artefact of inherited daughter isotopes and mixing, so that in fact the radioisotopic analyses really have no age significance. Ultimately, as with the millions of years timescale attached to the geological column based on the assumptions of uniformitarianism and organic evolution, radiometric and all dating methods are based on assumptions about the unobservable past. Therefore our confidence should be placed instead in the 6000–7000 year chronology given us by our Creator in His eyewitness account of what happened in the past.

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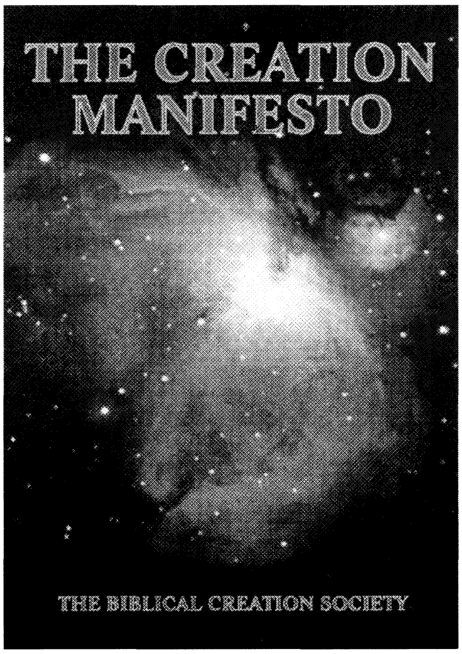

THE CREATION MANIFESTO

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Mike Matthews

CHRISTIANS take the Bible as the Word of God, as their only authority and guide as to what to believe and what to do: what the Bible says, God says. And this must include what the Bible says about Creation. So what does God day about Creation? Christians need to know what the Bible says, and then they must believe it!

The *BCS Creation Manifesto* is a positive document, setting out the key things that the Bible teaches about creation, particularly about God, man and salvation, and their practical consequences. Creation is woven into all of the Bible, Old and New Testaments, and this document shows that it is not possible to believe the Bible's teaching without believing in creation. It does not, however, try to cover everything, but what we believe to be the minimum that can be accepted on the subject and still be faithful to God's Word.

The *Manifesto* is in three parts. The first part covers what the Bible says directly about Creation, how all things began, and what happened soon afterwards. The second part show the practical consequences of this teaching: how its teaching affects what we do and what we should do today. It shows what it means for us, and why creation is still totally relevant. The third part highlights certain statements that the Bible makes that directly impinge on the teachings and practice of various areas of science, and which cannot be ignored by the Christian in studying those areas.

Bible texts underpinning each statement have been placed in the marginal notes , but it is important to understand that those statements are drawn directly from the Scriptures quoted.

Since this is a positive statement of the unchanging Word of God, it does not seek to demolish or bolster any of the transitory ideas or theories of man, whether Christian or anti-Christian. Rather, let those ideas be brought to the rock of truth: and wherever they disagree, they must be wrong. Let God be true, and every man a liar.

1. What the Bible says About Creation

A: The Authority of the Bible on this subject

The Full Inspiration of the Bible

There is always discussion about just how the Bible should be interpreted, and to what areas of life it can be applied, so it needs to be stated at the outset what the Bible says about itself.

We are told that the Word of God, the Old and New Testaments, was written by human authors, but God guided them by his Holy Spirit to write only what was absolutely and eternally true.[1] This means that every word that was originally written down was true, whether it be speaking of spiritual things or of nature, or history.[2]

The First Chapters of Genesis

Genesis 1–11 is the main passage which relates how everything was created, how man fell into sin, and how God judged the world with a worldwide Flood. Not only are these chapters written as sober history, clearly meant to be understood as such, but were taken as such by the New Testament writers, and by the Lord Jesus Christ Himself.[3] God is His own interpreter, so we must see the origin, identity and importance of Adam and Eve in the same way that the New Testament sees it.

Since God's purpose in causing every word to be true was to reveal the truth in his Word, and not to conceal it, it follows that the Bible is clear in what it says: so we know that events recorded in these chapters—Creation, the Fall of man, and the Flood—actually occurred and are accurately recorded for us.[4] This does not mean that the words of the Bible can be treated as 'scientific' statements: the infinite God has to take account of the limitations of finite man, nevertheless it is all without error. But it does mean just this—God means what He says!

B: The Creation of All Things

The Creator Himself

There are a number of faiths that share a belief in creation, but one of the key distinguishing truths of the Bible is the identity of the Creator himself: the triune[5] God of the Bible, without a beginning and without an end. All three persons of the Trinity were active in Creation.[6] In particular, the Lord Jesus Christ is the one through whom and for whom all things were created, both physical and spiritual (for instance both men and angels).[7]

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[1] 2 Timothy 3:16

[2] 2 Peter 1:20–21

[3] Matthew 19:4; Romans 5:12–14; 2 Peter 2:5; 3:5–6; Jude 11–14.

[4] The Bible makes it clear where God is speaking figuratively or poetically; and this is not the case in Genesis 1–11. This does not mean that all the Bible is always easy to understand; however; partly because of man's sinful blindness.

[5] Triune refers to the Trinity; the mystery of three persons in one God; and one God in three persons.

[6] Genesis 1:1–2; John 1:3

The Creation in General

Creation is the foundation, as it were, of the Bible—though not the central truth, as the foundations of a building, though vital, are not the main purpose of the building. The Creator and His Creation are two separate things, not mixed in any way, and this distinction is basic to the understanding of reality, as in Genesis 1:1. Every created thing therefore finds it purpose, its fulfilment and meaning through a right relationship to the Creator.[8]

God created all things (matter, energy, time, space, and spiritual beings) out of nothing (*'ex nihilo'*)[9]: before the Creation, God was all that existed. This initial act can be called 'absolute creation'. However, in some important phases of creation, such as the creation of the first man and woman, God used materials He had already created. These phases can be called 'mediate creation'.

The visible world, including all the universe, was formed, structured, and filled with life in six consecutive natural days.[10] The initial creation was 'formless and empty'[11] and the world was formed and filled on the succeeding days: our seven day week is thus defined by God, by the six days of creative activity followed by the one day of rest.[12] On that seventh day God rested from His work of creation, which was finished and complete[13]: after this creation is always spoken of in the past tense.[14]

God's work of creation in that first week was therefore a complete, finished work, and God himself described it as 'very good'[15]: there was no sin in that creation, nor any of its consequences.

Providence

Whilst God's work of creation was complete, He did not just leave it, but He has continued since that moment to keep it together, keep it going, and have full control over it, by means of that same 'powerful Word' through which everything was called into existence.[16] These works of God in upholding, sustaining and governing are commonly called 'providence', and are the basis of 'natural law', as the scientist would see it. The regularity and dependability of 'natural law' are illustrated in the Bible by references to the seasons[17] and to day and night.[18]

Creation, however, both 'absolute' and 'mediate', is a divine act which is of a different nature to His work of providence: God's creative acts are acts of His power which result in the existence of things which were not. Examples are the origin of life, the creation of man, and at the end of this present age, the resurrection of all people.[19]

C: The Creation and Nature of Man

Man and Woman

God made Adam, the first man, out of the 'dust of the earth' and then breathed directly into him so that he came alive, and was made 'a living being'.[20] Animals are also described as living beings[21] so Adam could not have come from an animal or pre-human being, otherwise God could not have described the moment of man's creation as when he first became a living being. So the creation of Adam, from earth that was not alive, was truly 'special'.

God created Eve, the first woman, in a special way as well, from the side of Adam.[22] Every human who has ever lived is descended from Adam and Eve, just as God planned.[23]

Made in God's Likeness

Adam and Eve were both made in the 'image' of the God who made them,[24] and it is this which makes man different from the animals: man alone is a spiritual being, able to have a personal relationship with his Creator.[25] Adam and Eve were sinless when they were made, and were in complete harmony with God in a perfect relationship until they disobeyed Him.[26]

In Charge of the World

When God created the human race, He put them in charge of the rest of creation,[27] and this included the right to use it and the responsibility for taking care of it.[28]

D: Creation and the Gospel

The Fall

Man's first act of disobedience, known as 'the Fall', was an historical fact. It was punished by both physical death[29] and spiritual death, as Adam and Eve became separated from God by their sin.[30] Adam's descendants inherited his fallen, sinful nature,[31] and also were subject to both forms of death and to God's judgment:[32] so we are all born sinners,[33] who will die,[34] and indeed are already spiritually dead. Since death was a result of the Fall, no man died before the Fall.

God's judgment also fell, as a result, on all creation, over which man had been given control. It thus became subject to 'the bondage of corruption' and will remain so until Christ's return.[35] The ground was cursed,[36] thorns and thistles would make things difficult,[37] and animals began to die[38] as part of this judgment.

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[7] John 1:3,10; Colossians 1:15–17; Hebrews 1:2

[8] Romans 9:20–21; 11:36

[9] Hebrews 11:3

[10] God defines the length of the creation days: 'There was evening and there was morning—the first day' (Genesis 1:5 and subsequent days). There is a clear continuity between these days and the natural days later in Scripture (*e.g.* Genesis 7:10,12; Exodus 16:30) and history; so we have no reason to think they were other than 24 hour days, as today. The sun, moon and stars are only secondary sources of light and timekeeping (Genesis 1:14–18) and the initial conditions of creation in this respect will again be experienced (Revelation 21:23–25)

[11] Genesis 1:2

[12] Exodus 20:8–11

[13] Genesis 2:1–2

[14] Hebrews 4:3

[15] Genesis 1:31

[16] Psalm 33:6; John 1:1–3; Colossians 1:16–20; Hebrews 1:3; 2 Peter 3:5

[17] Genesis 8:22; Acts 14:17

[18] Jeremiah 33:25

[19] 1 Corinthians 15:20–23

[20] Genesis 2:7; 1 Corinthians 15:45ff

[21] Genesis 2:19

[22] Genesis 2:21ff; 1 Corinthians 11:8; 1 Timothy 2:13

[23] Genesis 1:28; 3:20; 5:3ff; Acts 17:26; Romans 5:14

[24] Genesis 1:27; 5:1

[25] Genesis 2:15–17; Psalm 8:3–8

[26] Genesis 2:25; 3:8

A Physical Resurrection

In the New Testament salvation for man in Christ is fully revealed, and this salvation is from both the penalty and consequences of sin, including the major consequence of physical death.[39] Just as humans had a miraculous origin, they will also have a miraculous destiny, everyone who has ever lived and died being raised from the dead when Christ returns:[40] but then they will either be with Christ for ever, or punished for ever. We cannot consistently accept this supernatural destiny without also accepting our supernatural origin.

The Purpose of Creation

All things were created by Christ and for Christ,[41] but He will be seen at His most glorious in the new and restored creation.[42] The focus will be Christ, the Lamb of God, and the church which He has redeemed by his blood,[43] and this was God's purpose in creating the world.[44]

The Two Adams

An essential element of the New Testament teaching on salvation is the correlation between the first Adam as mankind's 'representative head' in sin and death, and Jesus Christ, the 'last Adam', as representative head of those who have been redeemed, being justified and enjoying eternal life.[45] Man's descent from Adam and inheritance of original sin is, therefore, integral to the gospel.

2. What the Bible's Teaching on Creation Means Today

The Bible's teachings that are highlighted in Part 1 are not mere ideas, but have immediate practical application and relevance in today's world. Indeed these truths of Creation are the foundation of morality, and are vital to the gospel itself. This section applies those teachings to today: the points of application relate directly to the similarly-titled sections in Part 1.

A: The Authority of the Bible on this subject

The Full Inspiration of the Bible

Whilst it is not a 'scientific textbook', the Bible is not wrong in anything it says about matters of nature, or history, and all statements it makes about them are totally reliable. Any method of interpretation which undermines 'verbal inspiration'[46] is unacceptable, as is the idea that it is possible that the created world can be 'read' and understood quite independently from God's revelation in Scripture.

The First Chapters of Genesis

As Christians, we have to accept what the Lord Jesus Christ and the apostles believed and taught about the origin and destiny of the human race. Genesis 1–11 is therefore to be understood by us as sober history, and not mythology or apocalyptic, or symbolic literature. This must be the case if we accept that God has given his Word to reveal and not to conceal.

Since God's acts of Creation as recorded in Genesis 1 and 2 are miracles, we cannot examine the processes of creation by normal scientific methods. The consequences of these acts, however, can be investigated, provided that we recognize their miraculous and unique origins.

B: The Creation of All Things

The Creator Himself

All worship, praise and obedience is due to God, the Father Almighty, Maker of heaven and earth, and to His only Son, Jesus Christ our Lord, because He is the Creator.[47] Indeed all of the created order plainly shows that it was created and proclaims its Creator.[48] Any who fail to acknowledge the Creator are therefore without excuse and subject to God's just judgment, because they wilfully neglect this evidence.[49]

The Creation in General

God has given the whole creation to man to be enjoyed with gratitude,[50] though self-denial may be required out of love, or for God's service.[51] Nevertheless because creation is the handiwork of God it is to be respected by man as well as enjoyed.

Providence

Creation, as an intelligent, purposeful act of God, with a clear end in view, cannot be interpreted by ideas of 'randomness' or 'blind chance'.[52] Since God also sustains and holds together all that He has made[53] we must see His hand in the ongoing continuation and consistency of the material world (*e.g.* the way night follows day and the regularity of the seasons).[54]

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27 Genesis 1:26,28; Psalm 8

28 Genesis 1:28; 2:15

29 Genesis 3:19; 5:5

30 Genesis 3:24; Ephesians 2:1,5

31 1 Corinthians 15:21,22

32 Ephesians 2:3

33 Psalm 51:5

34 Romans 5:12; 8:21–23

35 Genesis 3:16; 17–19; Romans 8:19–21

36 Genesis 3:17

37 Genesis 3:18

38 Genesis 3:21

39 1 Corinthians 15:20–23,26

40 John 5:28,29; 1 Corinthians 15:23

41 Colossians 1:16

42 Romans 8:18–21

43 Ephesians 1:23; Revelation 21:22

44 Matthew 25:34

45 Romans 5:12–21; 1 Corinthians 15:21–23,45–49; 1 John 5:11,12

46 'Verbal inspiration' is the teaching that every word in the Bible was 'God-breathed' and, therefore, infallible.

47 Revelation 4:11; Psalm 149; Colossians 1:16

48 Psalm 104; Romans 1:19,20

49 Psalm 19: 1–4; Romans 1:18–25

50 Psalm 104; 1 Timothy 4:1–5

51 Romans 14:21; 1 Corinthians 7; Matthew 19:12

52 Proverbs 16:4; Romans 9:19–22; Colossians 1:16

53 Colossians 1:17; Hebrews 1:3

54 Genesis 8:22; Psalm 104

Since God is in control of His creation, He is also in control of history and from Creation has ordered all events according to His will.[55]

C: The Creation and Nature of Man

Man and Woman

Men and women are equally made in God's image,[56] therefore anything that leads to the treatment of either sex as inferior is sinful, and Christians must recognize that in Christ there is equality of the sexes.[57] Nevertheless at creation the husband was given the headship in marriage[58] and this has been reaffirmed in the gospel age.[59] This headship is not to be domination, which is a sinful consequence of the Fall[60] but is to be expressed in love, service, and honour.[61]

God created mankind for lifelong marriage between one man and one woman,[62] which means that polygamy is not his intention, and that adultery, fornication, homosexuality and easy divorce are offensive to God and are destructive to us as His creatures.[63] However, God created man a physical being and declared that this was good:[64] therefore we must not despise the body or sexuality, nor forbid marriage. On the contrary we should enjoy the good physical life that God has given.[65]

Made In God's Likeness

Man was created with the ability to communicate, in language, and that language is to be used to tell the truth, as our creator tells the truth:[66] and as a creation of the triune God, one God in three persons, mankind was made a social creature, created for relationship with his fellow man and with his God.[67]

Since God created man for a purpose, every person has a God-given potential to fulfil.[68] As humans we have a dignity and worth unique in all creation,[69] being in the image of God, and this demands respect and love for all members of the human race. Every person is descended from Adam[70] and all share God's image, therefore no-one is to be considered of less worth because of race, class, education, culture, job status, or sex.[71] This image is borne even in the womb[72] and thus human life is to be treated with all respect and care from conception to death. This means that abortion,[73] the killing of children, euthanasia, and embryo experimentation must all be rejected.

In Charge of the World

Man was put in charge of the rest of creation, to rule over it on behalf of the Creator;[74] he is therefore responsible to God for the way he exercises this stewardship. This dominion is expressed in the fact that Adam named all the birds and animals, at God's behest;[75] scientific activities such as biological classification are therefore a proper part of that dominion.

Man's dominion also means shaping and changing the world, not just tending what is there.[76] Activities such as agriculture and technology are also therefore good in principle, but only when there is a proper respect for the creation, and we must oppose wanton and unnecessary destruction of any part of it. Care for the environment must be balanced with its use for man's benefit, and we must maintain a biblical perspective on the greater value of man in our concern for animal welfare.[77]

The Fall has made it very difficult for man to exercise his dominion.[78] Whilst it is a blessing to work as in doing so we express an aspect of God's image in us, yet it is also a curse and a trouble because of the Fall.

D: Creation and the Gospel

The Fall

Because of the Fall, man has become a sinner, incapable of living to God's glory or reflecting His righteous and holy character. His thoughts, words and deeds bring upon him the judgment of God, which includes alienation from his Creator.[79] He is therefore completely dependent on God's grace, expressed in Christ, if he is to be restored to fellowship with that same Creator.[80]

The Fall has brought the effects of sin into every aspect of human life: relationships between man and God, man and his body, man and himself, between man and woman, man and fellow man, man and nature, and even into creation itself, in that it is the sphere of man's dominion.[81] Other effects include alienation, suffering, frustration, decay and sorrow: the true root cause of man's problems is, therefore, sin.

3. Bible Statements which are Definitive for History and Science

While the Bible is not a scientific textbook, it makes some clear statements which have a direct bearing on the study of various areas of science, which provide both frameworks and baselines for the study of those subjects. The disciplines and issues dealt with in this section are of crucial and central importance

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[55] 2 Kings 19:25; Proverbs 16:4; Acts 17:26; Romans 9:19–22; Ephesians 1:11

[56] Genesis 1:27

[57] Galatians 3:28

[58] Genesis 2:18–23

[59] Ephesians 5:23

[60] Genesis 3:16

[61] Ephesians 5:25–33

[62] Genesis 2:18–25; Matthew 19:4–6

[63] Romans 1:24–27; 1 Corinthians 6:9–10; Revelation 21;8

[64] Genesis 1:31

[65] 1 Timothy 4:4

[66] Genesis 1:28; 3:9–19; John 8:44

[67] Genesis 1:26–27

[68] Genesis 1:28; Ecclesiastes 12:13

[69] Psalm 8; Matthew 6:26; 10:31

[70] Acts 17:26

[71] Romans 12:16; James 2:1–9

[72] Psalm 139:13–16; Job 10:8–12

[73] Abortion in this context refers to those things deliberately done by man to end the life of a human fœtus. It is recognized that there might be occasions where the medical judgment is that the only choice is between saving the life of the mother or the baby.

[74] Genesis 1:28; Psalm 8:6

[75] Genesis 2:19,20

[76] Genesis 1:28; 4:3, 4; Deuteronomy 8:7–9

[77] Matthew 6:26; 10:29–31; Luke 12:24

[78] Genesis 3:17–19

(though many others could be cited), and failure to incorporate them into the relevant disciplines will result in failure to fully understand the subject, and failure to glorify God in that area of His creation.

A: Cosmology

The created order had a specific and definable beginning,[82] and the sun, moon and stars were created after the earth, on the fourth day of Creation.[83, 84]

B: Genetics and Sociology

The Created Order

The created order was originally perfect, thus it had no genetic defect, or any disease, in any part of it;[85] therefore before the Fall there was no human physical death, defect or disease, these being the result of Adam's sin.[86]

Plants and animals were created in definite groupings referred to in Scripture as 'kinds', and they reproduce after these kinds.[87] However, the history of all land animals and birds has a genetic 'bottleneck' at the Flood. Only those individuals in the ark, representatives of each kind, survived.

Mankind

Man was separately created as a being distinct from the animals, so while he shares some physical characteristics with animals, he is the only creature made in the image of God, with all that image means (see Part 2), and he is unique.[88]

Mankind was made as two distinct sexes,[89] and the whole race is descended from Adam and Eve.[90] Everyone on earth today is also descended from Noah, his wife, and their sons and daughters-in-law, who were saved from the Flood in the ark.[91]

C: Geology, History and Anthropology, including Zoology and Palæontology

Human History

The genealogies in Genesis show that all human beings come from Adam, and the Creation account tells that man was created on the sixth day. Even if there are some gaps in the genealogies, the earth cannot be more than a few thousand years old.[92]

Genesis also shows that from the beginning man was civilized, intelligent and cultured: the use of bronze and iron tools, domestication of animals, cultivation of crops and production of musical instruments were known.[93] The picture (usually presented by evolutionary anthropologists and historians) of the upward struggle of man from brutish origins to modern sophistication is not supported by the Bible.

The recorded human life spans at the beginning of history, which appear to be typical, were about 900 years.[94] Following the Flood, the earth's population became concentrated around Babel, and subsequently migrated from there over the whole earth[95] and life spans decreased.

The Flood

The great Flood as described in Genesis Chapters 6 to 8 really happened in history, as the Lord Jesus Christ confirmed;[96] to deny this, therefore, is to disbelieve the words of Christ himself. Nevertheless the reality of the Flood will be denied in what Peter describes as the 'last days', and its crucial importance will, therefore, be ignored.[97]

The Flood was a disaster of a magnitude never known before or since, and covered the earth for about a year.[98] This Flood was global—no part of the earth's surface remained above water[99]—and all human beings living at the time died in the Flood except for the eight in the ark.[100] All air-breathing land creatures also died in the Flood except for those also in the ark.[101]

The Flood and its after-effects must of necessity have vast implications for the study of geohistory; they must have left geological features that are still observable today. Geology and anthropology (the study of man) must, therefore, always be studied with reference to the Genesis Flood.

Religion

Since the truth about God was revealed at the Creation and through nature,[102] all other religions are false, and must be seen as a departure from the truth. However old the documents of other religions, they, therefore, come after the truth as recorded in Genesis. So, it is both reasonable and necessary to preach the Christian gospel to adherents of other religions with a view to their conversion, for only in this way can they be reconciled to their Creator.

D: Linguistics

Man was created as a being made to communicate (see Part 2), who was initially able to talk directly with God[103] and had the power of speech from the very beginning of his existence. Indeed, from the Creation until after the Flood the earth had one common language; God brought different languages into being at Babel.[104] This may mean that

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[79] Romans 3:19–20; Ephesians 2:1–3; Colossians 1:21

[80] 2 Corinthians 5:17–19

[81] Genesis 3:14–23; Romans 8:18–22

[82] Genesis 1:1; Matthew 19:4; Hebrews 1:3

[83] See 10.

[84] Genesis 1:14–19

[85] Genesis 1:31

[86] Genesis 3:19,22,23; Romans 5:12; 8:10,11, 20,21

[87] Genesis 1:11,12,21,24

[88] Genesis 1:26,27

[89] Genesis 1:27; Matthew 19:4

[90] Genesis 2:20–23; 3:20; Acts 17:26

[91] Genesis 9:1; 2 Peter 2:5

[92] *e.g.* Genesis 5; Genesis 10; 1 Chronicles; Luke 3:23–38

[93] Genesis 4

[94] Genesis 5

[95] Genesis 11:9

[96] Matthew 24:37–39; Luke 17:26–27

[97] 2 Peter 3:3–7

[98] Genesis 7:11; 8:14

[99] Genesis 7:19–24; 2 Peter 3:6

[100] Genesis 7:21–23; 2 Peter 3:6

[101] Genesis 7:21

[102] John 1:1–4; Romans 1:20

[103] Genesis 3

[104] Genesis 11

there is no common root for those languages initiated at Babel, but it does not mean that there has not been subsequent development and fragmentation of languages and dialects after that event.

E: Psychology and Philosophy

Man is a spiritual being and the main purpose of his existence is to know God (see Part 1). Any attempt to fully understand man without reference to his spiritual nature is wrong and doomed to failure, and all existential, materialistic and nihilistic philosophies are, therefore, opposed to the truth.

Epilogue

Christians have always acknowledged that they have not fully understood every part of the Bible, and so we believe that in the area of Creation also further diligent prayerful study will yield greater understanding of the Word of God, and, therefore, of the world around us. Consequently we hope that greater agreement can be obtained in the future over many issues which are still the subject of controversy. The fact that there is no definitive statement about these in the *Manifesto* does not mean that they are of lesser importance, only that we recognize that differing views are possible in those areas, within the parameters set down in the *Manifesto*.

We may never arrive at satisfactory answers to some of our questions, and there may be room for different interpretations within a biblical framework, but it is at least likely that we, individually or collectively, have failed to see that which God has clearly revealed, because of our sinful blindness. We need therefore to be humble and open-minded, and ask our God to show us more of his truth.

However we must continue to stand firm on those things which our Lord has made clear, concerning the creation of the world and the nature of man, for what we believe concerning our origin is fundamental to our destiny.

The origin of life itself

THE EVOLUTIONIST believes that life originated from naturally occurring chemicals. Basically the scenario is described as the formation of simple organic compounds (such as amino acids, sugars, fatty acids, *etc.*) from an oxygen-free atmosphere. These then coalesce chemically ('polymerisation') to produce the large molecules that make up a living cell. From these, the cell is formed. Is it feasible?

How long would you have to shake a flask containing a concentrated mixture of proteins, carbohydrates, fats, *etc.* before a living cell formed? Yet this is a much more preferable mixture than that which could be formed by the evolutionary scenario.

The proposed sequence of steps is fraught with scientific problems. The oxygen-free atmosphere is highly improbable and there is no evidence that it existed. In addition, it would be chemically unstable. If oxygen were present, it would prevent the formation of the simple organic substances. Attempts to simulate the reactions in the laboratory are irrelevant and do not generate the required materials.

These chemicals are produced in a mixture of two configurations. Chemists compare these forms to right- and left-handed gloves. They are not interchangeable and chemically they can be very different. For example, the 'right-handed' form of limonene smells of oranges, but the 'left-handed' form smells of lemons. A drug used to treat sickness in pregnant women proved to be dangerous because it contained the two forms. In nature, only the left-handed form is used among the amino acids and the right-handed version for sugars. A living system is necessary to produce these specific forms.

The process of polymerisation is the reverse of that experienced in non-living cells. A typical protein can take up to 100 million different ways of twisting itself together in space, but only one of these is biologically active.

Recent theories have argued that the initial biological system was probably based on RNA, which might facilitate replication processes before the living cell was formed. Orgel, a leading chemist, described this as 'the prebiotic chemist's nightmare'. RNA is a large molecule produced by the polymerisation of smaller units (nucleotides) on a sugar chain. But, no-one can show how these basic units would have arisen!

Speaking of the problem of the origin of life, another leading scientist (G. Wald) said, 'One has only to contemplate the magnitude of this task o concede that the spontaneous generation of a living organism is impossible. Yet here we are—as a result, I believe, of spontaneous generation.' Quite an act of faith!

J.H.J.P.

The Relevance of the Biblical doctrine of Creation

Andy C. McIntosh

SOME Christians today regard the matter of Creation as somewhat of a side issue. Many say words like 'So you have your view that Genesis is literal history, and I have the view of the Creation days being long periods of time and God using Evolution—It doesn't really matter, as long as you believe the Gospel, that Christ died for our sins'. What should our response be to this type of statement?

Biblical Authority

Firstly we have to realise that at the heart of this matter is the question of biblical authority and that this is a crucial matter of relevance to Christian witness. Of course it is true that salvation is not dependent on whether I believe in Creation. No more so than when those saved from drowning in the icy cold seas off Newfoundland in 1912 needed to know who had made the few lifeboats that were actually launched from the *Titanic* before it sank. But to be prepared for a similar tragedy, maritime designers caring much for the safety of their passengers were most concerned about the design of lifeboats. In exactly the same way, if we are serious and earnest about reaching the millions of our own country with the great Gospel of Jesus Christ, if we are serious about witness to a dying world, if we are involved with open-air work, door-to-door evangelism and getting the message out to the ordinary person concerning the Christ of the Scriptures, then we must be fully confident in the Scriptures themselves. Are they reliable or not?. The lifeboat must be watertight.

The question of origins soon comes into conversations when one is involved in witness to thinking people. Whether we are made by Someone or have come about with no purpose has a direct bearing on how we operate in every day life. Am I answerable to anyone? Who is the boss? Who made the rules? If there is a Person who has made us, then purpose, plan and absolutes have a direct bearing on my life. If I am created, then the meaning of life comes from outside, not within. Young people at open-air meetings will often speak with disdain concerning the Bible, if one refers to it for authority in preaching. The reason is that they have been taught by many (and, sadly, probably most) teachers in the state schools that the Bible is not reliable and certainly cannot be trusted in the matter of origins. The media today is full of anti-Christian sentiment. The BBC and ITV series of nature documentaries seem very convincing to the average viewer—full of overt and at times more subtle references to 'what people used to believe—special Creation, but we have now come of age. We don't believe all that now—Christianity is outdated'—this with the unsaid implication, that God is dead, unnecessary and even ridiculous. This is the prevailing sentiment in our culture in Britain today—and what is it all based on? Atheistic humanism with evolution as the god which cannot be questioned.

This is why whenever someone dares to march with a different drum on this issue, people do stop and listen in open-air or other evangelistic meetings, or simply in one-to-one conversations. Why? Because this is immediately relevant to Mr. and Mrs. Average, Miss Teen or Mr. Twenty, since they see that what we are saying has implications. We are touching a nerve. Some will be curious, others will argue heatedly against you, others will scoff, but they rarely will be apathetic, because you are touching most modern people's world-view—daring to question what everyone has assumed to be true. In some ways this is no different to Martin Luther who, when standing firmly for Scripture in his day, dared to pin his 95 theses on the church door at Wittenberg in the autumn of 1517. Yes it was revolutionary, but most important. The attack was relevant because the Roman Church had undermined the Gospel with its indulgences system, making money out of oppression—in the name of Christ! To dare to touch the dominant thinking made his message immediately relevant to the ordinary person, as well as the authorities. How significant that Luther also wrote the following:

> 'If I profess with the loudest voice and dearest expression every portion of the truth of God except precisely that little point which the world and the devil are attacking, I am not confessing Christ, however boldly I may be professing Christ. Where the battle rages, there the loyalty of the soldier is proved, and to be steady on all the battlefield besides, is mere night and disgrace if he flinches at that point.'

As 2 Corinthians 10:4 states 'for the weapons of our warfare are not carnal, but mighty through God to the pulling down of strongholds'. We cannot storm Satan's citadel without grasping that reaching out with the Gospel and seeing the minds of people opened up to Christ is first a spiritual matter, and, secondly, understanding how deeply the ungodly system in our western culture is rooted in evolution.

Consequently it is pointless with some people to go straight to speaking of the Gospel itself, when they are not over the first hurdle in their understanding. Paul realised this when speaking to the Athenians on Mars Hill (Acts 7:22–31). They had no background like the Jews concerning Creation. For Jews he could go straight in to speak of Christ's death fulfilling the Old Testament sacrifices. But not with the Greeks of Athens. There he had to first define his starting point of the God who created the world. Our western society is in a similar position. There is very little real thought of the awesome Creator God in mens' minds. So we have to state very clearly who God is—to say He is the Creator, and to spell out the implications, is very important, else further communication will seem irrelevant to them. By doing this we are emphasising the authority of the Bible from its opening pages.

Some think that there will be greater respect in evangelism, by taking a view that God used evolution to make us (theistic evolution). However, apart from the issues raised concerning the theology of the atonement (see a subsequent section), the world sees this as no challenge to its dominant man-centred philosophy. The thinking sceptic simply says of the theistic evolutionist, 'You have your crutch to put behind the grand edifice of evolution—I prefer just to believe in evolution'. The subtlety is that rather than the direct challenge being that the sceptic be brought into submission to God's Holy Word, the issue has shifted to a debate concerning how evolution works. Any average thinking person knows that evolution is nowhere taught in the Bible; he knows that the straightforward rendering of Scripture is a diametrically opposed philosophy—special Creation. Consequently when speaking to men and women who doubt God's existence and have little respect for His word, it is much better to come up front with such folk, and show them that there is an alternative starting point, and that there is a totally different way of looking at the world in terms of an originally perfect creation marred by sin and rebellion. An atheist will not necessarily agree with you (usually because they want to justify a lifestyle where they are not answerable to the Creator), but they cannot deny the consistency of your faith. On the other hand if confronted with compromise on the very first chapter of the Bible, there is no real challenge to their atheism. This of course may not be the approach for all (for some still respect Scripture and do not necessarily need to start with Genesis), but if the first book is challenged, we need to have a clear and straight answer (1 Peter 3. 15).

Morality

The issue of Creation / Evolution is no mere academic matter, as some folks maintain. There is an immediate realisation, certainly in the minds of young people, concerning the implications. Consider some of these quotes from leading evolutionists :

> 'Most people grow up and go through their lives without ever really understanding Darwinism. They spend enormous amounts of time learning church teachings. This annoys me out of a love for truth. To me, religion is very largely an enemy of truth.' (Dawkins, 1990.)

In a frank admission of the religious nature of- evolution, two well respected scientists, Birch and Ehrlich, stated in the journal *Nature* :

> 'Our theory of evolution has become … one which cannot be refuted by any possible observation. Every conceivable observation can be fitted into it. It is thus 'outside of empirical science' but not necessarily false. No one can think of ways in which to test it. Ideas, either without basis or based on a few laboratory experiments carried out in extremely simplified training have attained currency far beyond their validity. *They have become part of an evolutionary dogma accepted by most of us as part of our training.*' (Birch and Ehrlich, 1967; italics added.)

Pierre Teilhard de Chardin quoted by Ayala, went further:

> '[Evolution] is a general postulate to which all theories, all hypotheses, all systems must henceforward bow and which they must satisfy in order to be thinkable and true. *Evolution is the light which illuminates all facts, a trajectory which all lines of thought must follow—this is what evolution is.*' (Ayala, 1977; italics added.)

Lewontin has written:

> '… whatever the desire to reconcile science and religion may be, *there is no escape from the fundamental contradiction between evolution and creationism. They are irreconcilable world views.*' (Lewontin, 1983; italics added.)

The late Professor Verna Wright, a leading communicator in the last decade, past president of the *Creation Science Movement* and Vice President of the *Biblical Creation Society*, one who saw many people converted through his ministry, said of our western decadent society:

> 'In our country there are two major systems of philosophical thought. The first is built on revealed truth (the Bible). On this is placed the block of divine creation, then absolute morality, issuing in responsible man and a caring world. The alternative has humanist philosophy as its foundation. Atheistic evolution is placed on this, then situational ethics (or amorality), issuing in autonomous man and self-centred society.' (Wright, 1988.)

Thus it can been seen that what you believe in this area identifies your foundational position. If we say that we accept evolution as well as biblical Creation (thus adopting what is called a theistic evolutionary stand point), then we are seeking to build a doctrinal structure on a foundation of the enemy, not one which is an integral part of the biblical framework.

The diagram may help to show the connection between foundational beliefs and standards.

Care of the individual	Survival of the fittest
Sanctity of life	Abortion
Moral standards	Pornography
Marriage	Homosexuality
Laws	Lawlessness
Creation	Evolution
Biblical Christianity	Atheistic humanism

Table: The Importance of Foundations

The unbelieving sceptic may pay lip service to a convenient set of morals which gives him some stability, but any hint of absolutes is an anathema to him/her. Ultimately the only individual which matters is himself. The 'selfish gene' principle of Dawkins is only the logical step from this foundation. We should not be surprised. This philosophy will never entertain a belief in a spiritual reality. Everything comes from minerals; men and women are no different to animals. Abortion and fœtus experimentation will not be considered inappropriate, just as euthanasia at the other end of the scale is renamed 'mercy killing'. Pornography is available in virtually all newstands with homosexuality simply regarded as a valid alternative lifestyle (despite the medical dangers it usually is connected with). It is significant that teens TV advice chat shows are now affected by the lack of any clear distinctiveness on role models for boys and girls—thus the low moral standards so pervasive in our culture in the last 20 years concerning heterosexual behaviour, casual relationships and the like, are now being overtaken by the far worse suggestion that homosexuality is just one other possibility. The youth of our country, already degraded through the drugs scene, are now wide open to the increasing pressure to think positively of that which the Bible so explicitly condemns. It is usually this particular sin which has been the trigger to God's great judgments of previous cultures such as Rome in the past. There is no Creator, there is no judgment, the vast beyond is nothingness, so why worry? Some with a measure of conscience have tried to bring in a sense of morality (the 'common good') into society. but such thinking is alien to the basic atheistic humanistic foundation which Britain is operating from, and in fact comes from the last vestiges of the other foundation—the Christian ethic remaining in Western thinking.

As Christians, if we want to influence the nation through our Christian base, if we want to produce faithful marriages, if we want doctors of principle who will stand against euthanasia and abortion, if we want to produce leaders who will stand for law based on Scripture in the political life of the nation, then we must teach, and teach carefully and systematically that foundations matter. As stated at the beginning, at the heart of this issue is the necessity to have a high view of Scripture when it comes to origins.

Death, Redemption and the Gospel

If we accept theistic evolution (that is, evolution directed by God), then we are in conflict with the biblical teaching on death.

Man died spiritually and physically as a result of the Fall

The origin of death is spiritual since Paul states (Romans 6:23) 'For the wages of sin is death ...' Behind sin is the devil who tempted at the beginning, so in Hebews 2:14 it states: '... that through death He might destroy him that had the power of death, that is the devil.' When Adam and Eve took of the fruit of the tree of the knowledge of good and evil, they died in two senses. Immediately they died spiritually, and with it the principle of physical death was established for them and the whole human race. God's command in Genesis 2:17 was '... of the tree of the knowledge of good and evil, thou shalt not eat of it: for in the day that thou eatest thereof thou shalt surely die.' Literally, 'dying, thou shalt die'. Consequently this meant that dying spiritually was immediate when Adam and Eve took of the tree of the knowledge of good and evil, bringing separation and loss of fellowship with God. Eventually (930 years later for Adam) their physical death was certain ('thou shalt die').

The person who insists that there was death before the Fall [of pre-Adamic hominids, *etc*.], is then faced with the dilemma as to what was the dramatic effect of the Fall described in Genesis?

There was no animal death before the Fall

At the Fall, the ground was cursed and the whole of Creation was put out of joint. We understand this from Romans 8:22, '... the whole creation groaneth and travaileth in pain together until now...' The implication is that the animal kingdom was affected also. There is an implication in verses such as Genesis 1:30 ('And to every beast of the earth, and to every fowl of the air, and to every thing that creepeth upon the earth, wherein there is life *['nephesh']*, I have given every green herb for meat : and it was so') that the animals and humans were vegetarians and death by predators was not known before the Fall.

The first recorded instance of shedding blood is by God Himself (Genesis 3:21) after the Fall. With the strong picture of substitution (the covering of Adam and Eve's nakedness by the skins of an animal killed by God), there is the strong implication that animals also did not experience death before the Fall.

This is all consistent with the statement of Genesis 1:31, and in other places, that all was good at Creation, and that it was the first man, Adam, who brought in death (Romans 5:12, '... by one man sin entered into the world, and death by sin; and so death passed upon all men...').

Christ our only Redeemer

The Bible is the story of Redemption. But the enormity of our need as unregenerate sinful people is linked to the vital truth that *we* sinned in Adam. Our death comes because Adam sinned. Our spiritual paralysis is directly descended from a real physical individual. When we grasp that, then the enormous wonder of the 'last Adam', Christ, takes on a glorious hue to the believer. Our creation was sixty centuries ago—millions of days as against millions of years! We sinned in Adam, our federal head, but now we have a new federal head, another Man, the God-Man, Christ Jesus. Thus we have verses like the following which stress Christ's breaking the power of death, and emphasise that death could not have been before the Fall, for Christ has come to reverse the effect of the Fall. He has broken the power of death and sin, for our sins are laid on Him:

1 Peter 2:24	'Who his own self bear our sins in His own body on the tree ...'
Psalms103:4	' ... who redeemeth thy life from destruction'.
Galatians 3:13	'Christ hath redeemed us from the curse of the law ...'
Romans 6:23	'For the wages of sin is death, but the gift of God is eternal life through Jesus Christ our Lord.'
1 Corinthians 5:21	' ... since by man came death, by man came also the resurrection of the dead.'
1 Corinthians15:22	'For, as in Adam all die, even so in Christ shall all be made alive.'
1 Corinthians15:47	'For the first man is of the earth, earthy; the second man is the Lord from heaven ...'

The whole of 1 Corinthians 15 in fact teaches very clearly that the first man Adam brought death, but that Christ, the last man, brings life. To tamper with this straightforward parallel is to tamper with the Gospel itself. It is ironic that Thomas Huxley last century was clear on this issue and skilfully worked to his own darker ends. Huxley realised that the removal of Genesis would lead to the whole of redemption falling down like a stack of dominoes:

> 'I am fairly at a loss to comprehend how anyone for a moment can doubt that Christian theology must stand or fall with the historical trustworthiness of the Jewish Scriptures. The very conception of the Messiah, or Christ, is inextricably interwoven with Jewish history; the identification of Jesus of Nazareth with that Messiah rests upon the interpretation of the passages of the Hebrew Scriptures which have no evidential value unless they possess the historical character assigned to them.' (Huxley, 1903.)

It is the considered view of the author that it is the biblical proclamation of Creation which we all should be presenting unashamedly to others, with not such a great emphasis on the scientific arguments. The Gospel should always be declared and needs no dependence on men, since Christ speaks independently of our changing scientific scene. By stressing the relevance of this issue, it is anticipated that more will pick up the importance of fearlessly presenting the truth of God's six day Creation and our Fall in Adam. At the turn of the millenium, the vital need for Christians to stand and be counted on this issue is more than ever needed, and relevant to our nation. If we desire revival in our decadent society, we must repent and come back as a church to a deep conviction in the authority and inerrancy of God's Word, right from Genesis 1:1.

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Reviews

Fertility & Faith: the ethics of human fertilisation, by Brendan McCarthy (Inter-Varsity Press, 1997) ISBN 0–85111–180–7. £12.99.

Reviewed by Sheena Tyler

WITH the Government's decision about cloning being very much in the balance, it is timely to visit the subject of Brendan McCarthy's book: the status of the human embryo and the ethics surrounding reproductive technologies. The book starts well enough, with a useful overview tracing the historical development of the law throughout this century, culminating in current legislation. We see, for example, how the 1929 Infant Life (Preservation) Act was intended to close a loophole in the law which technically allowed the killing of a child in the process of its birth, but how it actually led to the exploitation of greater loopholes. This is because it declared the 28th week of pregnancy as the beginning of viability deserving of special protection under law.

McCarthy traces the introduction of the concept that the life of the mother should be given priority over the life of the child, and of how even the mere mental and social quality of the mother's life should outweigh that of the fœtus. Particularly for younger adults who have only known the current legislation, it is good to be reminded that historically it was not always so. McCarthy is helpful too in demonstrating the *cul-de-sac* of equating the soul with the brain, an emergent property of the physical system (this is, unfortunately, an important current trend: see the report[1]).

He also rightly concludes that practices such as donor insemination, egg and embryo donation are wrong, and should be subject to prohibitive legislation. Some people might be unhappy with his view that surrogacy is morally acceptable as a form of fostering where a woman is medically unable to carry a child. He commendably affords the embryo protection against embryo research, saying that only treatment likely to be of benefit to the embryo is permissible.

He attempts also to grasp the nettle of finding points of contact between Christian and secular morality, avoiding the coercive laws of the past. He suggests that legislation should be against acts that are immoral, threaten the order of society, diminish the dignity of other human beings or harm creation. He argues that as well as its religious basis Christian morality must be inherently reasonable to society. He shows us too that many Christian submissions to the Warnock Committee, during the consultations leading up to the current British legislation, were often inadequate, failing to engage in the issue of morality. To me it seems that these submissions simply reflected the dire situation many denominations seem to have got themselves into theologically, becoming increasingly remote from Scripture and lacking subjection to its authority.

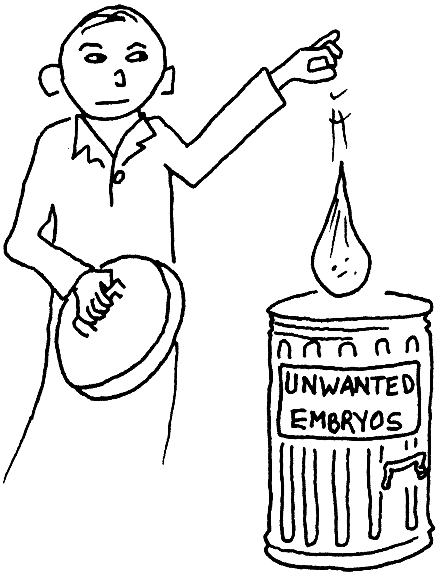
When we focus on the chapter 'The status of the human embryo: a biblical approach', the book is seriously flawed. Instead of saying what the Bible teaches, the author appeals to consensus interpretation. If we apply this approach to Christian doctrine, *i.e.* fundamental Christian truth, there is nothing we can proclaim to the world. So, for example, in Psalm 51 ('in sin did my mother conceive me') McCarthy is open to the traditional interpretation of inherited sinfulness, which would in turn support the concept of personhood from conception. Nevertheless, he cautions that the text is poetic, that David is engaging in hyperbole, and that the text allows an interpretation that David was conceived in sinful circumstances. Thus, whilst McCarthy feels that the passage suggests personhood, he claims that the evidence falls short of proof. The evangelical position, however, sees the personal identity of the newly conceived embryo emerging from this passage because the writer is inspired. The Scripture itself presents David as being inspired by God *e.g.* Romans 3, 4:6, 11:9–10. Moreover, the whole tenor of the psalm is to confess his own nature, polluted from conception. There is no hint that David's mother was unfaithful. As for it being mere poetry, it is simply a *non sequitur* that if something is poetic, it cannot at the same time be factual. Just because Wilfred Owen described the First World War in poetry does not mean that the First World War never happened. McCarthy is aware of this but nevertheless considers that if something is poetic, it detracts from its worth as a proof text.

A second example concerns Psalm 139:13–16 ('You knit me together in my mother's womb … intricately wrought me … Your eyes beheld my unformed substance '). McCarthy claims that the focus of attention is not the life of the embryo or its status but rather God's majesty, and again 'we must caution.because the writer might be writing poetically'. And yet, he concedes that this psalm 'clearly suggests that the psalmist believed in personal life before birth. He concludes by favouring a view of the embryo with personal status though the evidence falls short of proof. Is this the spirit of discipleship? Surely this psalm conveys God as fabricating the body *in utero*, that the person truly exists there, not merely at birth, and that this is an integral part of the omniscience of God. God is creating something wonderful, as opposed to those who want to get rid of it like taking the work of God and trampling it underfoot.

Thirdly, what of the Incarnation? This is just glossed over. He is unfortunately side-tracked by the issue of when the Incarnation was important rather than when it *began*. He quotes one commentator, for example, who judged the birth of Jesus to be of primary importance in this issue. Such considerations lead McCarthy to the error that the significance of the Incarnation is a matter for theological reflection rather than for biblical exegesis. Thus he fails to interact clearly with evangelical opinion, such as Nigel Cameron's compelling rationale that Christ's human life begins at conception, because there is no other point in the story at which it could occur, and He shares His humanity with us in all points except sin.

Every evangelical should be aware that there is no clear consensus on any doctrine if you take theologians *en masse* in the name of balance: they all bring their own subjectivity. It is very dangerous to proceed along these lines, because the Bible ceases to be revealed truth. McCarthy does assent to the concept of revelation: 'the Scriptures witness to God's revelation and … guide us in moral decision making' but somehow he is unable to apply these maxims in his survey of the Bible's teaching.

In discussing whether or not the presence of a soul makes an embryo fully human, McCarthy comments on materialism or reductionism, in which the person only comes to exist when the brain is sufficiently developed to allow thought and self-awareness. His main objection to this is that if our thoughts are merely the product of biochemical processes, then they would be entirely determined, which opposes any concept of free agency. However, the new reductionists deal with quantum uncertainties ultimately at the atomic level. They would say that there is statistical uncertainty about any outcomes, and our perception of this is free will. McCarthy rightly demonstrates the problems associated with ascribing personhood in terms of mind or body functions (functionalism). He gives an extreme example of this with the ideas of Peter Singer, who believes that rationality is the indicator of humanness: therefore infanticide is not morally wrong up to three years of age if no rationality is evident.



McCarthy indicates a move amongst some theologians, away from functionalism towards 'a less scientific and more dynamic' view of the human embryo. This is the position that he supports. He cites, for example, Foster's potentiality argument, 'since the fertilised egg has the potential to develop into the newborn baby, it has the potential to acquire whatever characteristics the baby has to acquire'; and the continuity argument expressed by Bentley: 'The embryo is genetically complete from conception; the potentialities are there from the beginning All attempts to locate within the continuum a point of transition from a pre-human to a human condition have been unconvincing'; and by Higginson 'What is present from the beginning is unquestionably alive..in a different way from the egg and sperm because (unlike either of those separately) it has the potential to develop into a human person'. He sides particularly with O'Donovan: 'the distinctive qualities of humanity are attributable to persons, not persons to the qualities of humanity', and 'it is a category mistake to say that a new conception cannot be a person until there is brain activity..For whatever criteria we take, we end up by reducing the notion of personhood to that one constituent of human functioning'. McCarthy then favourably cites Gareth Jones, who identifies fœtuses as 'one of us … the earliest versions of ourselves' and therefore have an intrinsic value. However, I wonder if McCarthy is aware of Jones' consideration at the 1998 Christians in Science/American Science Affiliation (CiS/ASA) conference that the transition to humanity may be as late as 20 weeks gestation[1].

The arguments from potentiality and continuity are certainly valid and good. Some problems remain, however. Firstly, whilst it may be true, as McCarthy suggests, that there is a theological shift away from functionalism, it seems that in the influential circles of CiS/ASA the neuroscientists and philosophers, dominant on the platform at the 1998 Cambridge conference, are pulling in a reverse direction. They see that the soul and mind are physiologically embodied, in a view called non-reductive physicalism (NRP). Thus, every aspect of man is related to his physical make-up, but it is not amenable to reductionist analysis because the soul and other human traits are 'emergent properties of matter'. One presenter even favoured the demolition of the concept of the immortal soul. It has been indicated1 that this position is in error, an inevitable outcome of naturalism, *i.e.* nature is all there is. Naturalistic science applied to the 'book of nature' will always lead to unacceptable revisions of biblical revelation. It is the open door to importing alien philosophies into Christian theology, as is the case, for example, with Darwinian evolution.[2]

Secondly, the book sets out to establish a clear foundation for a Christian basis for ethics in embryology. It seems that in resorting to consensus interpretation, his chapter on biblical considerations is of cardinal importance. If the book is to thus fulfil its aims, it is compromised and weakened. If the bible has nothing definitive to say, why should the Christian in particular be in this arena? This is precisely the situation we find today. And so the church, including to some extent even the evangelical wing, will continue to slumber still over these issues. Meanwhile the momentum of the reproductive technologies increases at a whirlwind rate, establishing new and increasingly bizarre practices into society often before legislation gets a chance. In the case of destructive technologies such as therapeutic cloning, in which the embryos generating the stem cells are destroyed, the result is an ever-growing massacre of tiny little unborn human lives.

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The advancement and defence of the biblical teaching on creation.
Research for a coherent biblical and scientific viewpoint.
A challenge to fellow Christians who have accepted holistic evolutionary views.

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The Society seeks to achieve its aims through public meetings and publications.

The Society has a number of members who are qualified to speak on various aspects of the subject and will assist churches, youth organisations, *etc.* in arranging meetings and conferences.
The Society publishes articles in its journal that advance its aims, provided the authors subscribe to our evangelical Basis of Faith and conform to our Creation Manifesto. This makes it plain that we accept that the biblical teaching Is of a young earth, deliberately and purposefully created by God in six days. Within these constraints, we allow our authors to explore and debate their preferred positions.

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Bone of Contention, by Sylvia Baker (Evangelical Press)
Evolution and the Authority of the Bible, by Nigel M. de S. Cameron (Paternoster Press)
Evolution: is it scientific?, by Sheena Tyler and Andrew Gough (Christian Publicity Organisation)
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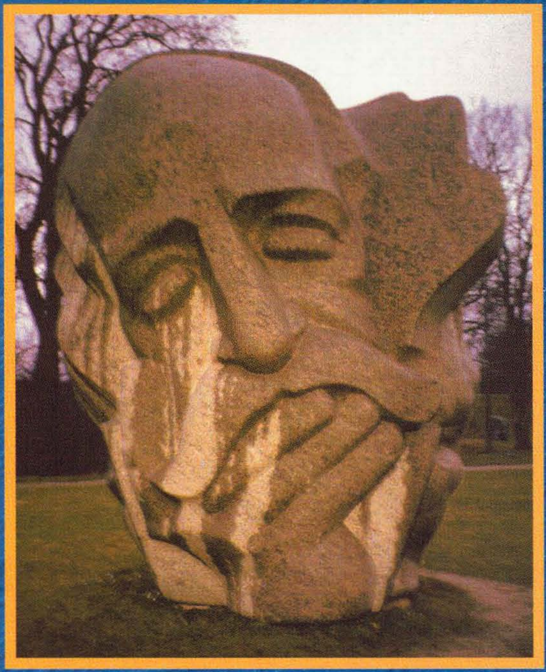

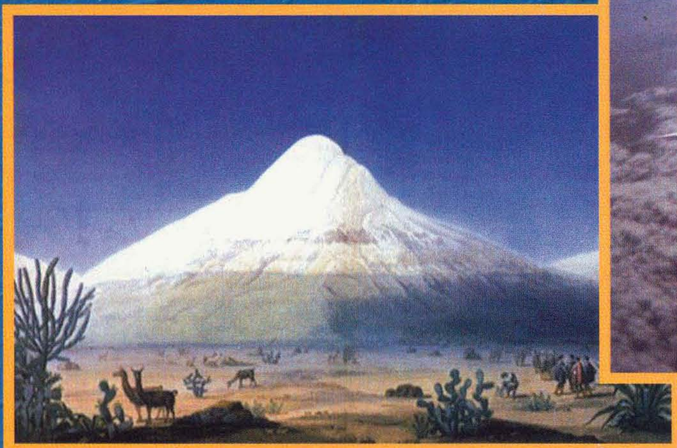

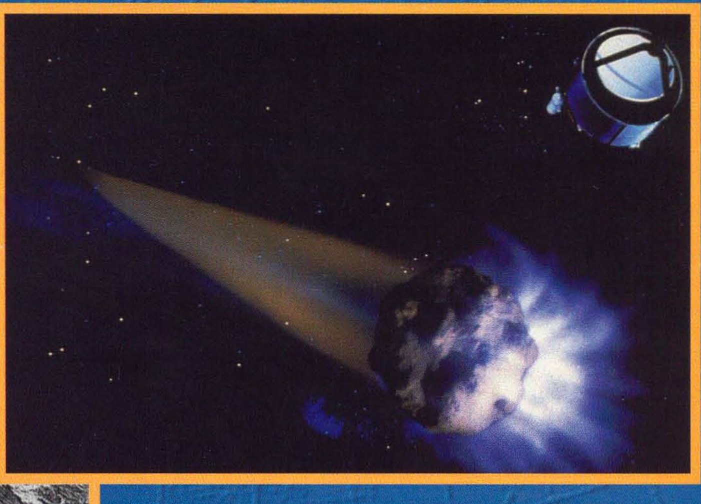

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